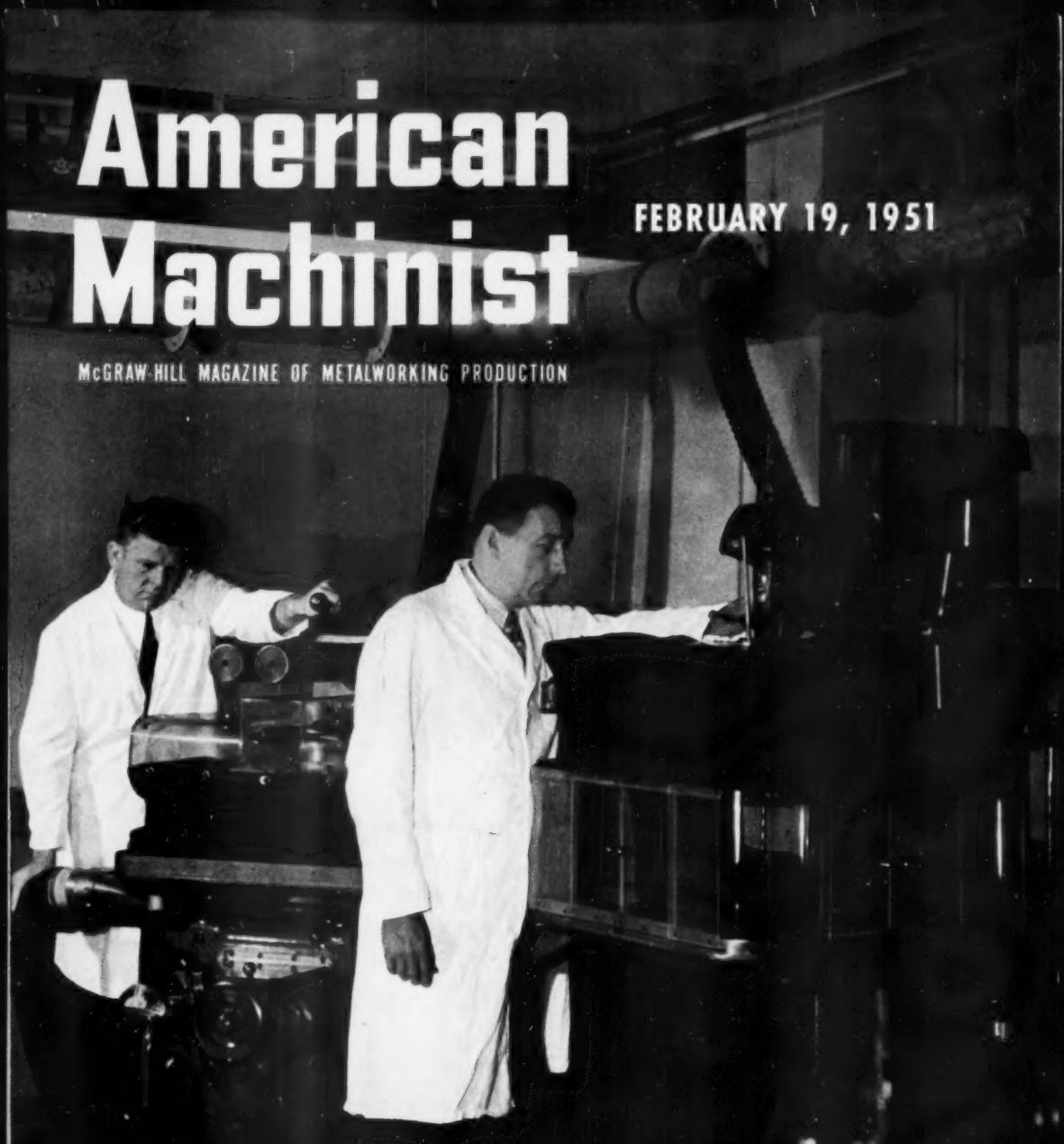
American Machinist

FEBRUARY 19, 1951

McGRAW-HILL MAGAZINE OF METALWORKING PRODUCTION



Hooded tools machine beryllium—see page 2

How to Machine Toxic and Radioactive Materials

Modernizing the Heat-Treat Department

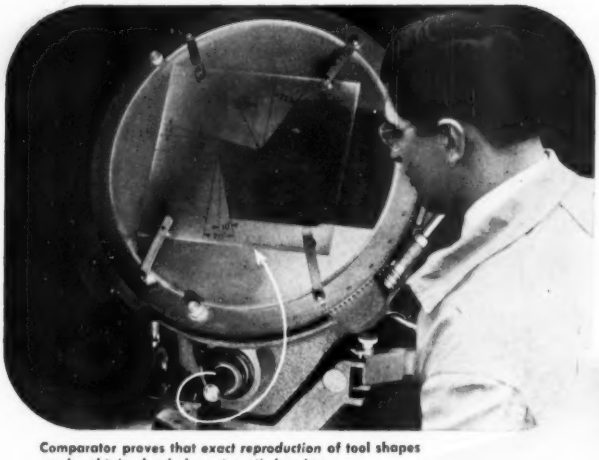
This "SCREEN TEST"

shows how to get peak performance

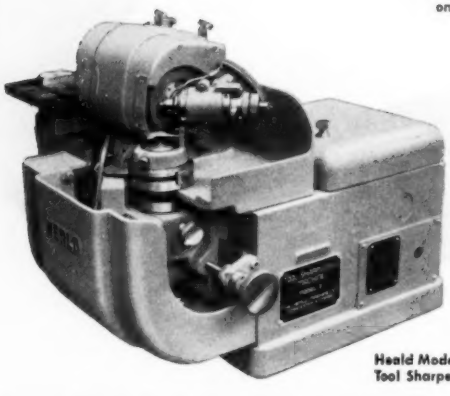
from your Heald Bore-Matics

. . . by sharpening your cutting tools automatically on a

Heald Model 2 Tool Sharpener



Comparator proves that *exact reproduction* of tool shapes can be obtained only by automatic lapping on a Heald Tool Sharpener.



Heald Model 2 Tool Sharpener

- **TOOLS LAST 2 TO 4 TIMES LONGER**
- **MORE WORKPIECES PER SHARPENING**
- **LESS MACHINE DOWN TIME**

WHERE schedules call for the maximum in both precision and production, it pays to take a good look at your *borizing tools.*

Are they being lapped by hand, with the possibility of human errors in the duplication of the required shape—and with microscopically irregular edges? If so, you can get higher sustained production, with increased precision and better finish, by using the Heald Model 2 Tool Sharpener.

This machine sharpens any borizing or cutting tool automatically—produces sharp, flawless cutting edges, and consistently duplicates the *exact* tool shape required, over and over again! Up to five different angles plus the radius may be preset on precisely calibrated scales, the tool inserted in the holder—and that's all there is to it. Operation is fully automatic, eliminating the possibility of human error.

Your nearest Heald representative will be glad to give you complete information on this time-saving, cost-cutting Tool Sharpener. Remember—when it comes to precision finishing, it pays to come to Heald.

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American Machinist

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AMERICAN MACHINIST, published bi-weekly by McGraw-Hill Publishing Company, Inc., James H. McGraw (1860-1948), Founder.

EXECUTIVE, EDITORIAL, ADVERTISING AND PUBLISHING OFFICES: McGraw-Hill Building, 330 West 42nd Street, New York 18, N.Y. Curtis W. McGraw, President; Willard Chevalier, Executive Vice President; Joseph A. Gerardi, Vice President, Treasurer; John J. Cooke, Secretary; Paul Montgomery, Senior Vice President, Publications Division; Ralph B. Smith, Editorial Director; Nelson Bond, Vice President, Director of Advertising; J. E. Blackburn Jr., Vice President, Director of Circulation.

SUBSCRIPTIONS: Address correspondence to American Machinist-Subscription Service, 330 West 42nd Street, New York 18, N. Y. Allow ten days for change of address. Please indicate position and company connection on all subscription orders.

Single copies, 50c. Subscription Rates—United States and possessions, $5 a year, $8 for two years, $10 for three years. Canada $7 for one year, $11 for two years, $14 for three years. Pan-American countries, $10 for one year, $16 for two years, $20 for three years. All other countries, $20 for one year, $30 for two years, $40 for three years. Entered as second-class matter, August 13, 1943, at Post Office, New York, N.Y., under the act of March 3, 1879. Printed in U.S.A.

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Chips and QUIPS

Hooded Monsters . . . Our cover Kodachrome, taken at Argonne National Laboratory, Chicago, shows machining operations on beryllium metal. A. A. Denst, left, is operating a No. 2HL Kearney & Trecker miller, and Albert J. Sieber a Walker-Turner radial drill. Both machines are hooded to prevent dust particles of this toxic material from escaping into the air. Machines have all controls outside the hoods; the drill has an extended feed arm.

For More Details . . . How to set up a shop to machine radioactive and toxic materials is described in detail in our lead article by S. S. Gold, mechanical engineer at Argonne. He explains how to keep chips and particles from coming in contact with the operator, and how to hold the volume of toxic dust in the room well below safe limits.

Shotgun Wedding . . . One current article belabors the old joke about the shotgun, but it really applies here. The story by Kenneth Ireland, chief metallurgist of High Standard Mfg Corp., described silver brazing of shotgun assemblies, hence we use "wed" in the old sense of "to attach firmly or indissolubly". Let's hope modern divorce laws don't affect the brazes.

More on Lathes . . . You will recall our Special Report of July 24, 1950, on multi-spindle bar machines. Now, "Mike" Rowan is going on to describe automatic lathes in our current Special Report. Described are types, operating methods, how they can be used, unusual and standard tooling—all in a primarily pictorial treatment. Later reports in the same series will take up turret lathes, screw machines, and other types of automatics. But each takes a lot of time, for data must be distilled and interpreted for your easier and faster use.

Oak Leaf Training . . . Our neighbors to the north have a government-controlled apprenticeship system. We asked Gabriel Rousseau, of the Quebec Dept. of Labour, to tell us about it. He explains Provincial variations, with emphasis on the differences in the Quebec plan with respect to that of the other Provinces.

Qualifying . . . Carbide-tipped tools have replaced rough grinding in removing 0.005 in. of stock at bearing fits on Chevrolet transmission shafts. Fay automatic lathes at 650 to 990 fpm do the job. They were "hopped up" with special bearings and doubled motor horsepower. John M. Finally, master mechanic at Chevrolet-Muncie Div. of GM, tells the story.

Decarb . . . Controlled atmosphere overcomes carbon depletion of cold-drawn, coiled-steel stock intended for heat-treated capscrews. John E. Tschopp, chief metallurgist, The Chicago Screw Co. describes the process. He joined Chicago Screw in 1933 (after studying electrical engineering at Purdue) as a cyanide pot-furnace operator, and worked his way up.

Swamped . . . Orders for our "Disaster Control" Special Report (*AM*, Nov. 13, 1950) are coming in in increasing volume. Included in recent large orders are 2000 for the Commonwealth of Penna. 10,000 for National Safety Council. Altogether, something like 25,000 copies have supplemented the 30,000 of our original run.

Coming . . . *AM* for March 5 will carry the first of a series of four Special Reports on threading, this one dealing with thread chasing. There'll also be articles on Ford's method of testing machine tools, on special gear cutting, apprentice methods at IBM, on the Air Force Pilot Plant, Adrian, Mich.

ANTI-TOXICIAN . . . Sidney S. Gold has been with the Argonne National Laboratory since June, 1948, as associate mechanical engineer and plant engineer. He has a background of machinist practice and toolmaking. After receiving his ME, he studied industrial management at UCLA, Santa Clara University, and San Jose State College.

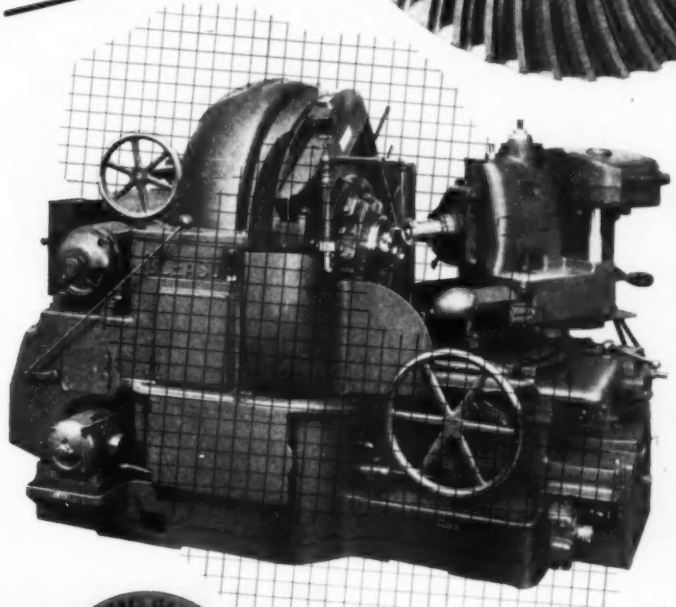
Now 34, he has had supervisory positions in tool engineering, process engineering, methods, and special machine design. Before the war, he specialized in die-mold design for Chicago Die Mold Mfg. Co. During the war, he was subcontracted to the Conrad Machine Works by Berg Engineering Service, where he had charge of tooling up spar-milling of jet-propelled aircraft. Previously, he was subcontracted to Admiral Corp. by Barnes & Reinecke, where he had charge of development and putting into production base stations and radio equipment for Signal Corps. There he designed high-production candy machines.

SPIRAL BEVELS

FOR SMALL QUANTITY PRODUCTION

ONLY 1 GLEASON MACHINE REQUIRED

FOR JOBBING SYSTEM USING
16° PRESSURE ANGLE
35° SPIRAL ANGLE



ADVANTAGES

1. Choice of length of tooth bearing
2. Fast cutting with multi-blade cutters
3. Long-lived cutters, simple to adjust
4. Fewer calculations than any other method
5. Easier and more direct set-up of both cutters and machine
6. More gears per cutter than from any other method

Investigation will prove that it is less expensive to produce any quantity, from a single pair to any number in mass production, on Gleason Machines than by any other method.

Ask about the Gleason jobbing system.

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GLEASON NO. 16 HYPOID GENERATOR

GLEASON WORKS
100 UNIVERSITY AVENUE - ROCHESTER 3, NEW YORK

CONTINUOUS GRINDING WITH

Two CINCINNATI FILMATIC No. 3 Centerless Grinders, in the plant of a prominent aviation equipment manufacturer, equipped to continuously grind piston rods.

CINCINNATI

CINCIN

CENTERTYPE GRINDING MACHINES • CENTERLESS GRINDING MACHINES

TWO-MACHINE TEAM DOUBLES PRODUCTION

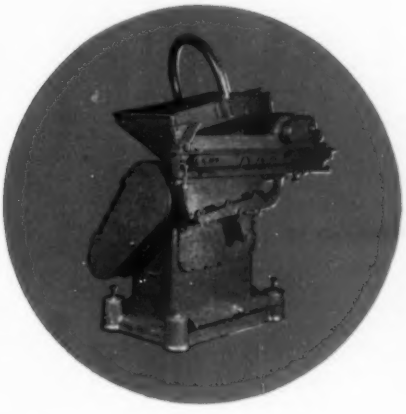
PRODUCTION DATA

Part name	Hydraulic piston rod (14" long)
Material	Alloy steel
Stock removal	First machine .061" on diameter Second machine .005" on diameter
Surface finish	20 micro
Production	143 per hour

One of the most economical ways to achieve large volume production is by the continuous machining method. How this was accomplished for precision grinding operations is illustrated here . . . two CINCINNATI FILMATIC No. 3 Centerless Grinders are hitched together to pull the production load of grinding piston rods. A CINCINNATI Feedmatic Hopper starts them through the first machine and a conveyor takes them to the second machine for the finish grind. And to maintain the highest quality finish, filters remove sludge from the coolant. Now one man controls this production team, and output per man hour is more than double the former method. ¶Continuous production becomes a reality with CINCINNATI FILMATIC Centerless Grinders handling the job. Their FILMATIC grinding wheel spindle bearings will never quit regardless of the load . . . lubrication is principally automatic . . . hydraulic grinding wheel truing . . . variety of standard attachments, including Feedmatic Hoppers for thrufeed and infeed operations. Other features and advantages are outlined in catalog No. G-570-1, and brief specifications may be found in Sweet's Catalog File.

CINCINNATI GRINDERS INCORPORATED
CINCINNATI 9, OHIO

CINCINNATI FILMATIC No. 3 Centerless Grinding Machine. Complete specifications may be obtained by writing for catalog No. G-570-1.



CINCINNATI Type "E" Feedmatic Hopper

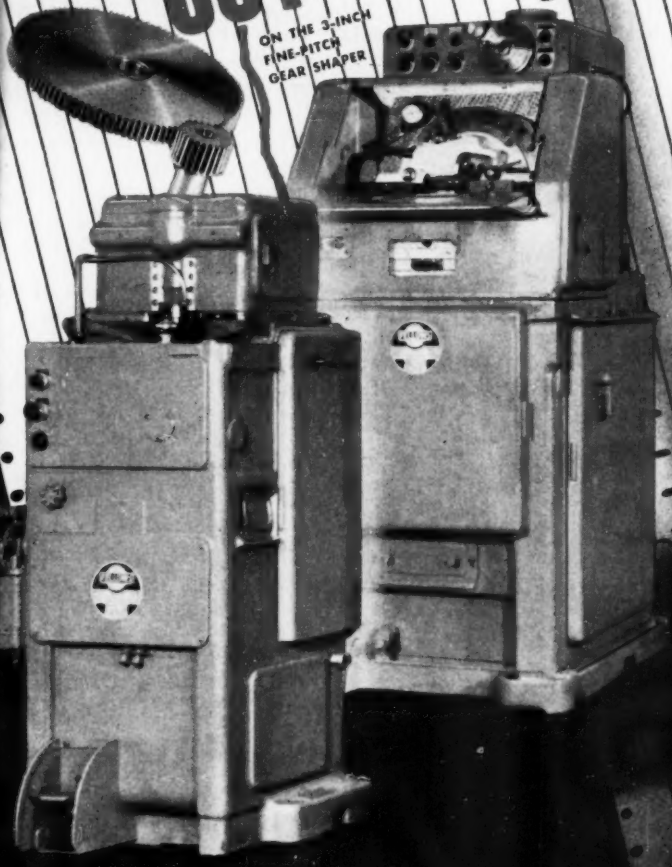
NATI

CENTERLESS LAPPING MACHINES • MICRO-CENTRIC GRINDING MACHINES

ACCURATE

FELLOWS
CUT
ON THE 3-INCH FINE-PITCH GEAR SHAPER

FELLOWS
SHAVED
ON THE NO. 4 FINE-PITCH GEAR SHAVING MACHINE



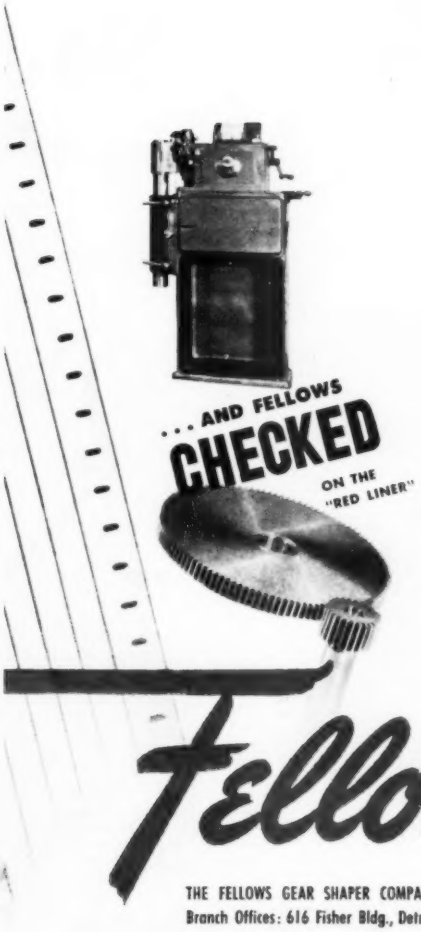
GEAR SHAPERS
SHAVING MACHINES
THREAD GENERATORS
CUTTERS AND SHAVING TOOLS
GEAR INSPECTION INSTRUMENTS

PLASTICS MOLDING MACHINES

GEAR OPERATIONS

...in Balance

Ability to Mass-Produce Fine-Pitch Gears to Tolerances in Low "Tenths" Spotlights The Fellows Method.



The balanced combination of the Fellows "Fine-Pitch" Gear Shaper and the No. 4 Gear Shaving Machine, aided by the superlative accuracy of Fellows cutters and shaving tools, assures unbelievably close limits. The inspection charts opposite are reproduced from production-run performance—where specifications demanded holding these 48-pitch gears to 0.0003" after shaving. ▾▾▾ The routine super-precision is accomplished by setting up for 3 cuts on the Gear Shaper, and 6 passes on the companion Fellows Shaving Machine. Notice, please, that with accurately-machined blanks it was possible to hold a maximum error after cutting to 0.0005"—and not over 0.0002" after shaving. ▾▾▾ If you have fine-pitch gears to produce, Fellows can help you hold to any tolerances that contemplated service demands. Write, wire or phone the nearest Fellows office.

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VERSATILITY

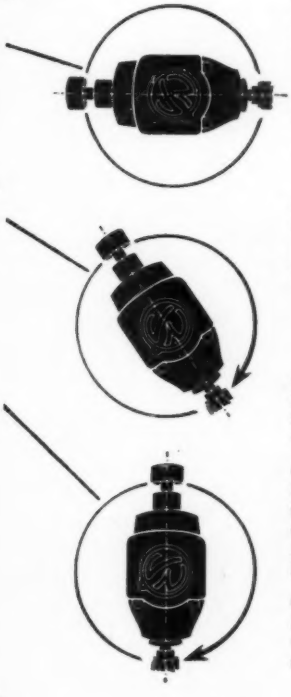
One of the that Produces at Lower

No.

VAN NORMAN

Van Norman Features More Profitable Milling Costs with the

22L Ram Type Miller



The versatility of the Van Norman No. 22L miller enables it to meet the daily fluctuating milling requirements in all types of plant work. It minimizes idle machine time, reduces work re-setups, provides more profitable milling at lower costs.

Here's how — the adjustable cutterhead permits horizontal, angular and vertical milling on one miller. Because setups are minimized, errors that often occur when workpiece is changed are eliminated. Overall milling machine capacity . . . vertical to horizontal . . . is always at peak efficiency.

In addition, front and rear directional controls provide ease of operation . . . reduce operator fatigue . . . increase efficiency. Conveniently located speed and feed selectors permit quick selection of proper speed and feed. Rugged construction throughout assures long operating life. Investigate the Van Norman No. 22L Ram Type Miller for your plant. Write for bulletin.

Important Van Norman Features

• VERSATILITY
Rugged adjustable cutterhead permits horizontal, vertical or angular milling . . . all on ONE machine . . . with standard tooling.

• EASE OF OPERATION
Finger-tip front and rear control of all power feeds. . . . Front and rear 6-way rapid traverse. . . . Large easy-to-read graduated dials. Aluminum alloy arbor supports for easy handling.

• SIMPLICITY OF CONTROL
All power feed controls are DIRECTIONAL — operate in direction of desired table, saddle and knee movement. . . . Rotary-type feed selector. . . . Convenient and accessible speed selector.

• INCREASED RANGE
Ram adjustment, in and out over column, provides added work range and capacity.

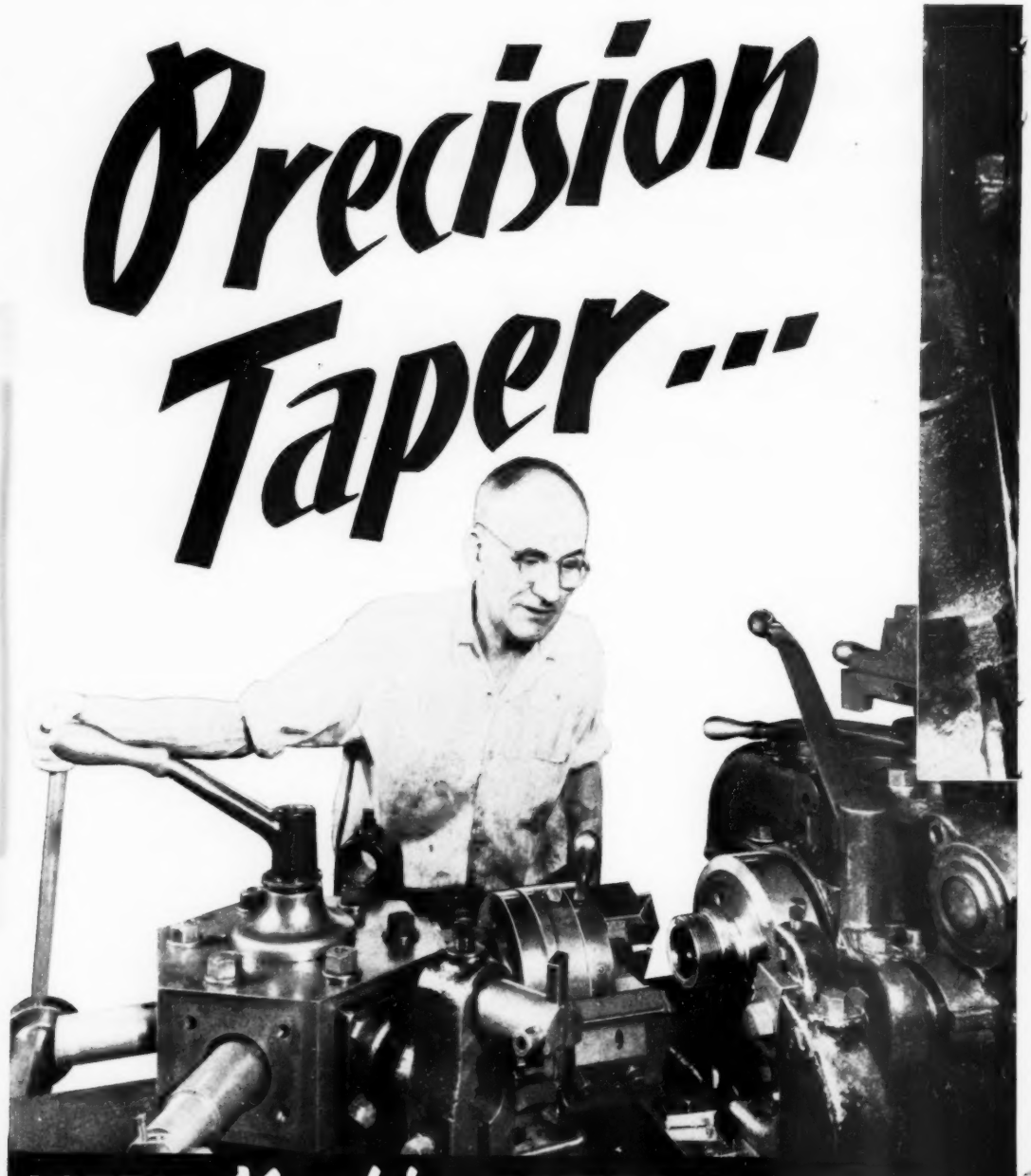
• RIGIDITY AND POWER
Spindle transmission gears are made of hardened alloy steel. . . . Lapped to assure smooth precision operation. . . . Multi-spline shafts operate on taper roller bearings. . . . Rugged column and base. . . . Massive knee.

• LONG LIFE
Precision built. . . . Automatic lubrication.

COMPANY, SPRINGFIELD 7, MASS.

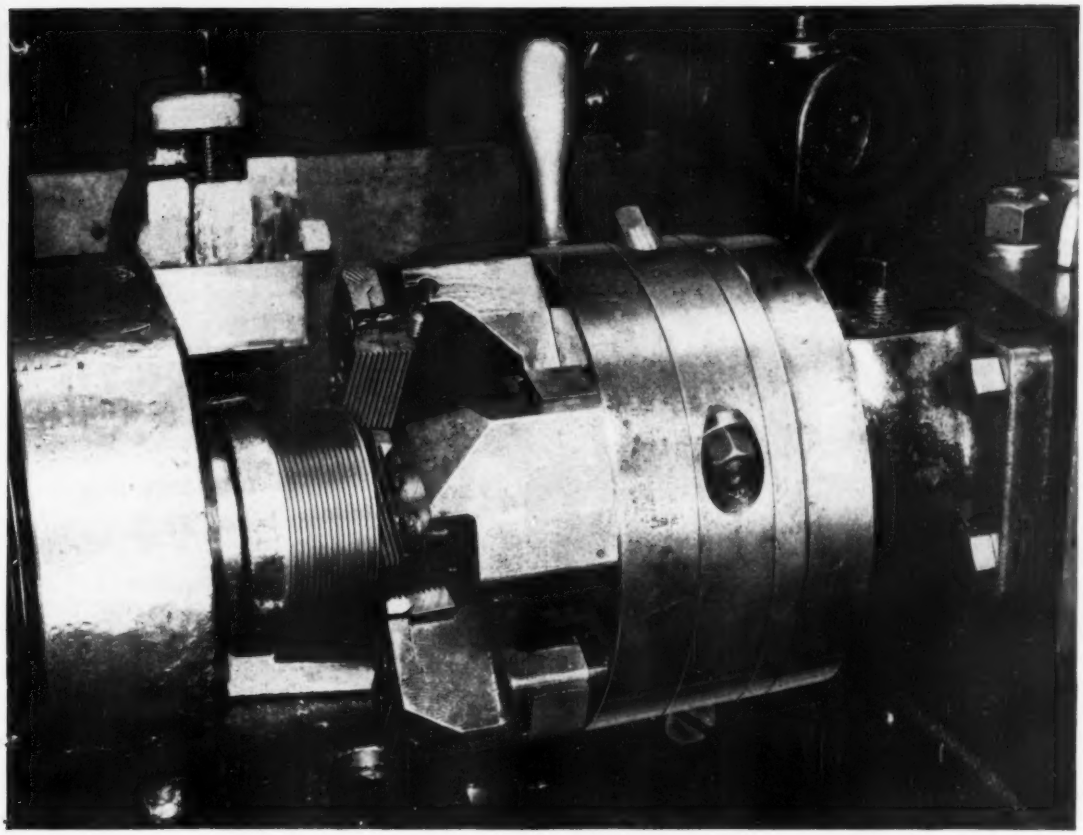
LANDMATIC DIE HEAD

Precision Taper...



LANDIS *Machine* COMPANY · WAYNESBORO PENNSYLVANIA

PRODUCES THREAD WITH



The 2" LANDMATIC Die Head with Taper Attachment illustrated is designed for cutting tapered threads where precision and thread finish are of prime importance.

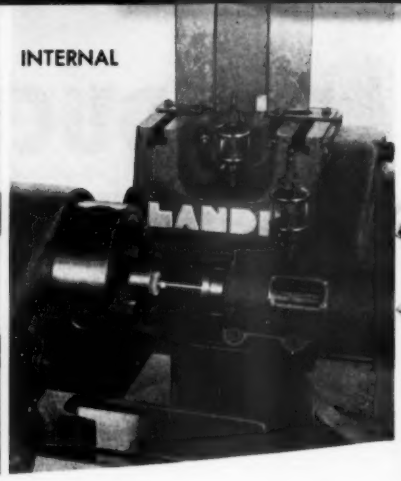
The mechanically-controlled operation of the taper attachment causes the chasers to expand on diameter as the work enters the die head. Thus, cutting strains normally encountered in producing tapered threads are minimized. This results in finer thread finish, greatly improved accuracy, and materially longer chaser life.

The value of the taper attachment is particularly apparent when cutting threads with high taper or of lengths greater than those ordinarily used for standard pipe threads.

Write for Bulletin F-90.

LANDIS TRADE MARK REG. U.S. PAT. OFF.

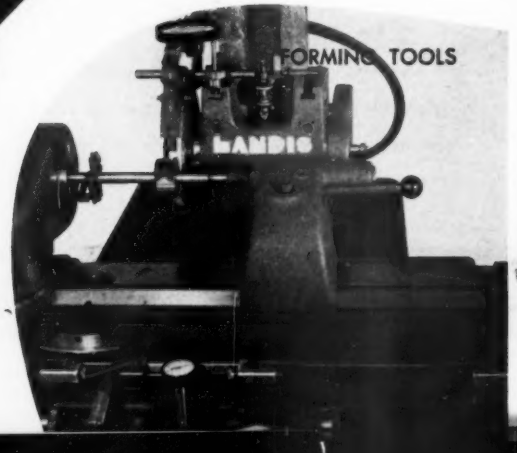
WORLD'S LARGEST EXCLUSIVE MANUFACTURERS OF THREAD GENERATING EQUIPMENT



24 DIFFERENT

12" x 28" Universal and Tool

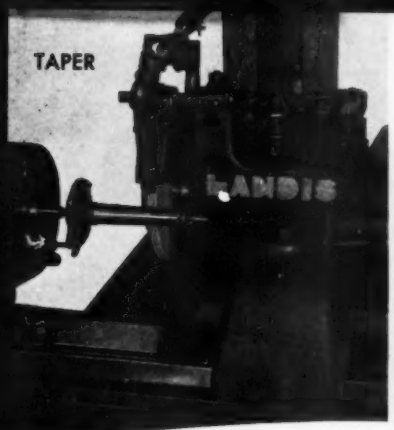
Some Typical Setups

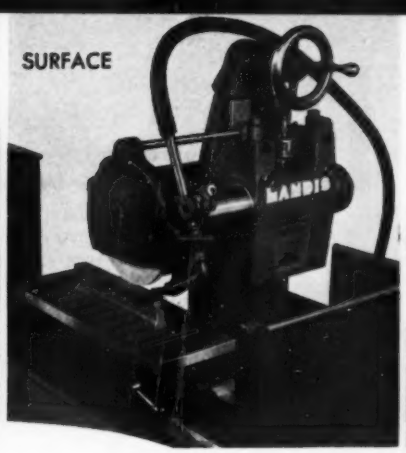


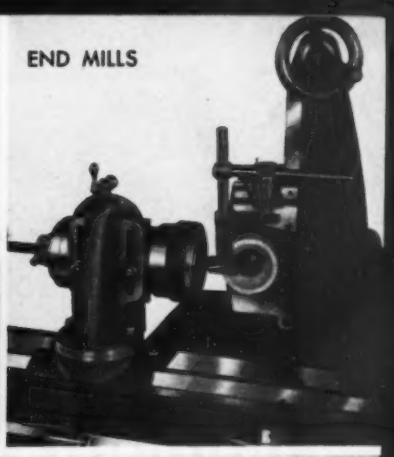
24-page catalog K45 gives full information and specifications of standard equipment and optional extra accessories for tool room and small shop work.

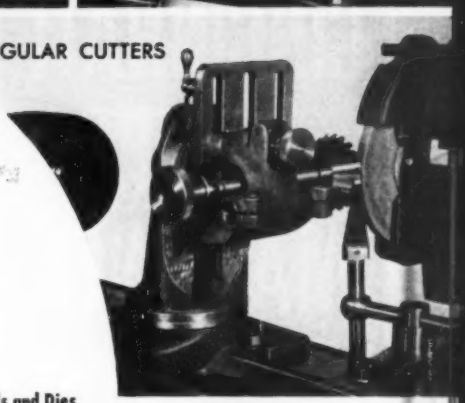
LANDIS TOOL

Precision Grinders









GRINDING OPERATIONS

with versatile LANDIS TOOL 12" x 28" universal and tool grinder

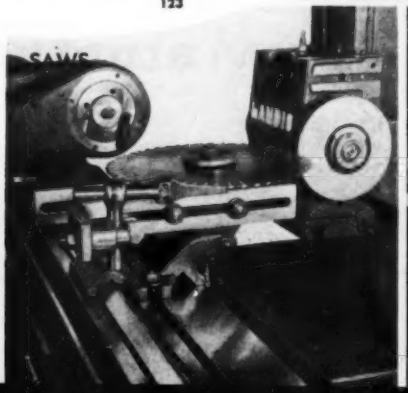
With Standard Equipment

1. Cylindrical
2. Taper
3. Face
4. Surface *(operations without attachments only)*
5. Clearance on Saws, Cutters and Reamers
6. Flutes on Taps
7. Face of Teeth on Formed Cutters
8. Spiral Mill Grinding

With Optional Accessory Equipment

9. Milling Cutters
10. Wet Grinding
11. Dry Grinding
12. Internal Grinding
13. Hobs *(right or left hand)*
14. Parallel Blocks, Flat Forming Tools and Dies
15. Surface Grinding *(quantity lots)*
16. Screw Machine and Other Forming Tools
17. Angular Wheel Face
18. Reamers, Taps and Form Cutters
19. Gear Cutter *(staggered or straight teeth)*
20. Cylindrical Work Requiring Work Rest
21. Face Mills *(up to 18½" diameter)*
22. End Mills *(with taper holding attachment only)*
23. Drills *(from 3/32" to 1½" diameter)*
24. Saws *(from 7½" to 26" diameter)*

LANDIS TOOL COMPANY / WAYNESBORO, PENNA., U. S. A.



These 3 Basic CINCINNATI HYPRO MACHINES offer Capacity and Versatility for *unusual* Planing, Boring and Milling Operations

1 Profitable Use of an Angular Side Rail for Unusual Work

Easy modification of a standard *Hypro Double Housing Planer* may readily solve trying machining problems to your advantage. Tooling and work setups of this kind indicate cost reducing efficiency difficult to obtain on other types of machine tools.

Planing three traction motor housings is easily accomplished by modifying a standard Hypro Double Housing Planer. Note the angle of the journal bearing seats to the planer bed.

2 Simplify Boring and Turning Operations on Awkward-to-Handle Castings

Take advantage of many machining short cuts to increase production by using this *Hypro Vertical Boring and Turning Mill.* Both rail heads and side head operating individually or simultaneously means increase in overall work output.

Standard and special work can be handled more profitably on this Hypro Vertical Boring and Turning Mill. There is ample machine power to operate all heads simultaneously.

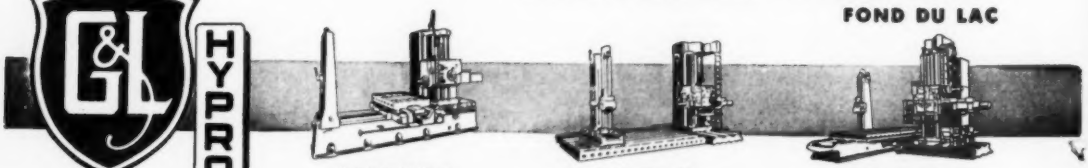
3 Gang Cutters and Side Heads Speed Work Output

This *Hypro Multiple Head Planer Type Miller* is adapted to a broad range of production milling operations. Performing a series of machining cuts simultaneously insures greater overall accuracy and at the same time reduces unit cost.

The machining method followed with this Hypro Multiple Head Planer Type Miller assures maximum accuracy of finished bed castings. Cincinnati's overall "packaged service" includes all tooling.

GIDDINGS & LEWIS
FOND DU LAC

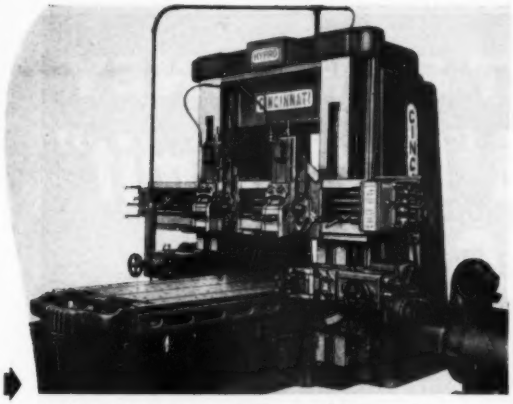
G&L HYPRO



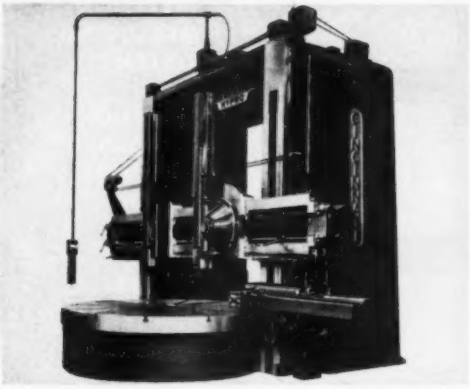
G. & L. Table Type Horizontal Boring Machine

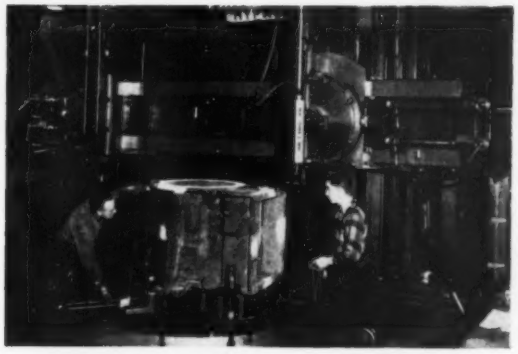
G. & L. Floor Type Horizontal Boring Machine

G. & L. Planer Type Horizontal Boring Machine

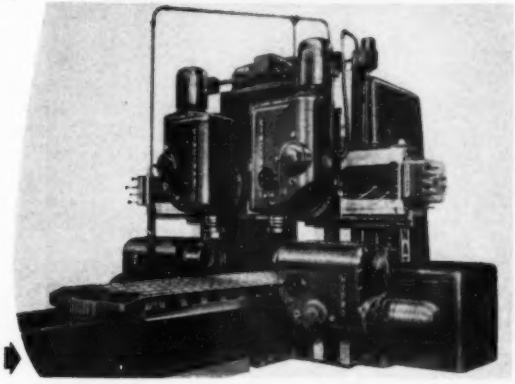


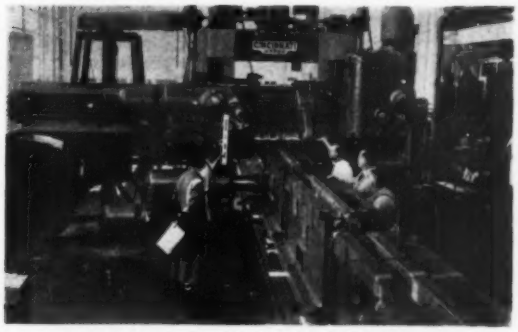
HYPRO DOUBLE HOUSING PLANER





HYPRO VERTICAL BORING AND TURNING MILL

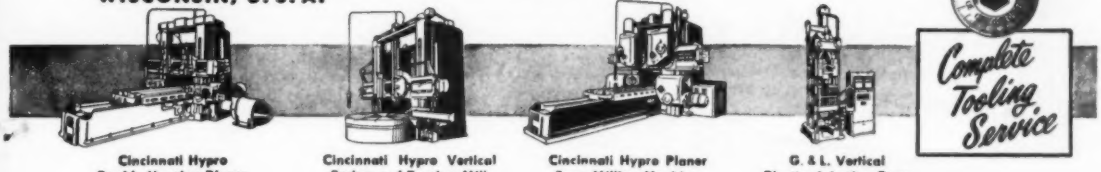




HYPRO MULTIPLE HEAD PLANER TYPE MILL

MACHINE TOOL COMPANY

WISCONSIN, U. S. A.



Cincinnati Hypro Double Housing Planer

Cincinnati Hypro Vertical Boring and Turning Mill

Cincinnati Hypro Planer Type Milling Machine

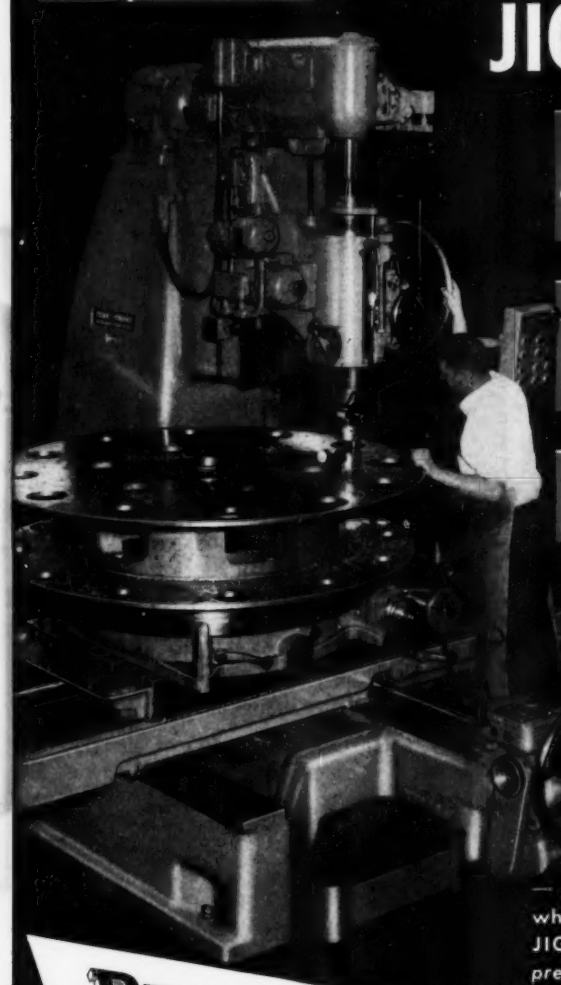
G. & L. Vertical Plastics Injection Press

DAVIS

Complete Tooling Service

All New!

PRATT & WHITNEY
No. 4E "*Electrolimit*" JIG BORER



Exclusive! NEW *ELECTROLIMIT* PRECISION MEASURING SYSTEM

Exclusive! PRECISION PRELOADED BALL ROLL SPINDLE QUILL

Exclusive! LARGEST CAPACITY OF *ANY* VERTICAL TYPE JIG BORER

— plus many additional new features which make the P&W No. 4E "Electrolimit" JIG BORER *the outstanding machine for precision boring in large work.* Write for complete information.

PRATT & WHITNEY
Division Niles-Bement-Pond Company
WEST HARTFORD 1, CONNECTICUT

"There's no better-paying Investment than the Right Tools for the Job"

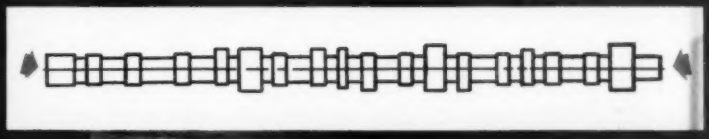
GARDNER

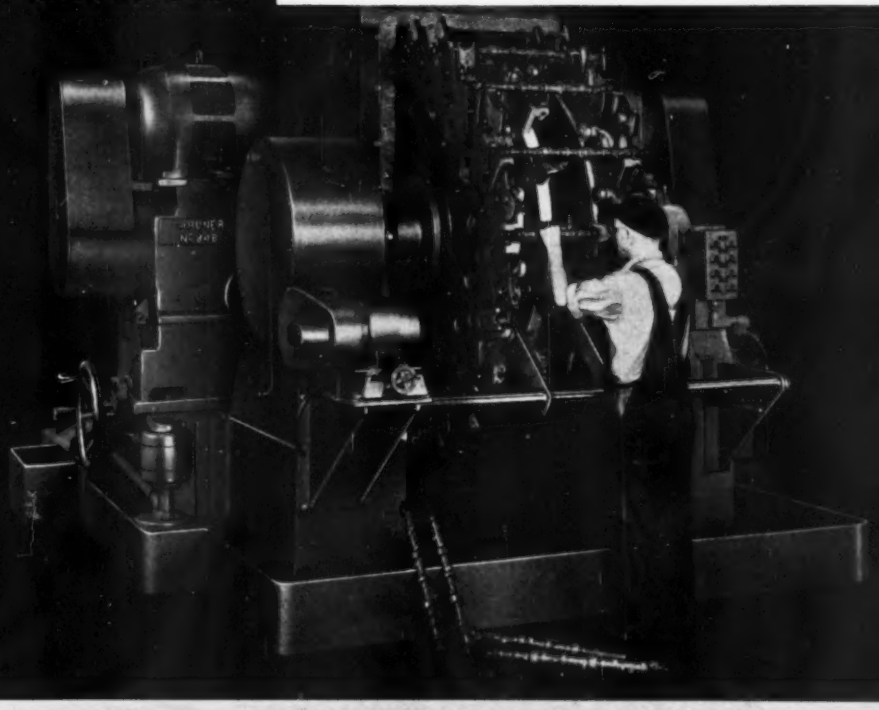
precision disc Grinders

Snag Grinding 1,000 Shafts Per Hour Lowers Unit Costs

TWO ends of camshaft ground in ONE operation

$^3/_8$" max. stock removed from each end of high test cast iron shaft. Rotating work carrying fixture with gravity unloading. Gardner 84B-40" Double Disc Grinder.





104M

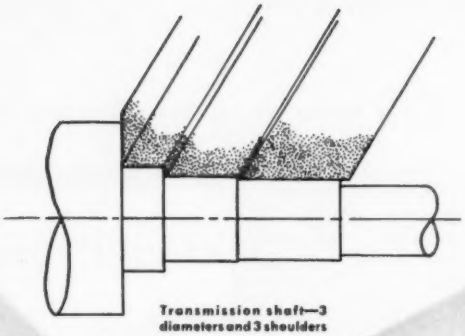
Request bulletin No. 12-7.

GARDNER MACHINE COMPANY

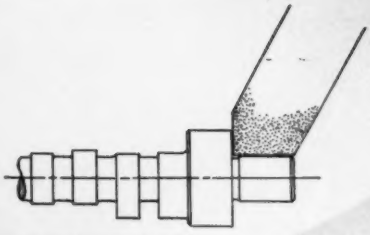
410 East Gardner Street • Beloit, Wisconsin, U.S.A.

NORTON *ANGULAR* WHEEL SLIDE GRINDERS

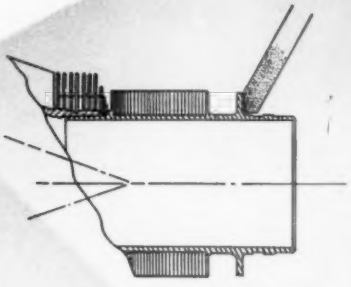
For grinding one (or more) diameters and adjacent shoulders



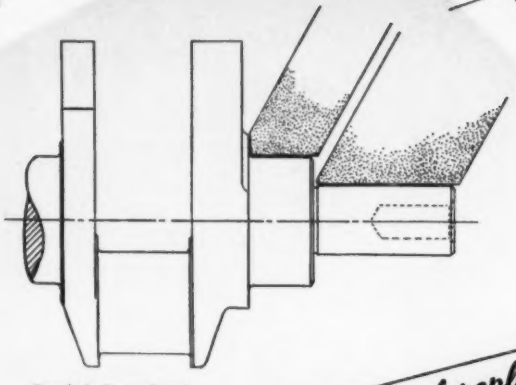
Transmission shaft—3 diameters and 3 shoulders



Camshaft—gear fit and thrust shoulder



Aircraft engine cylinder —flange seat and fit diameter

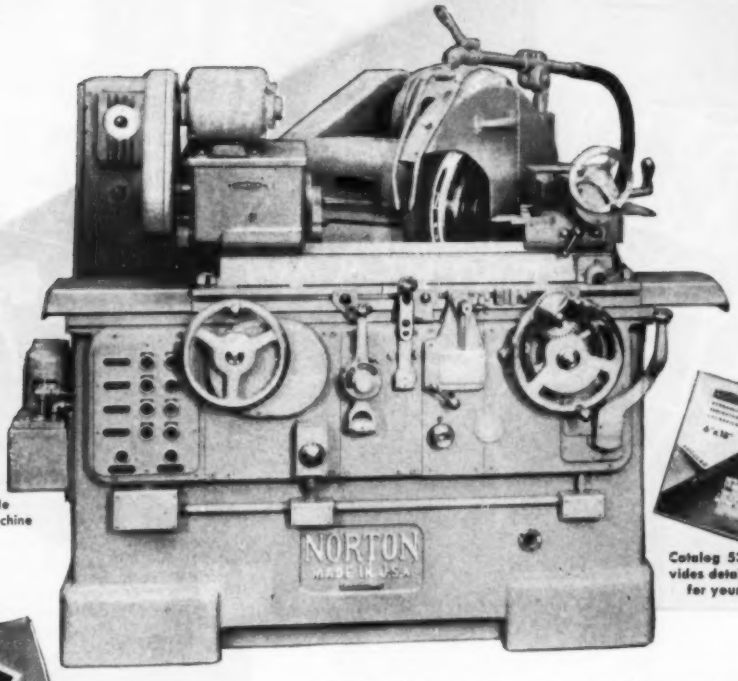


Crankshaft—end main bearing and shoulder and gear fit diameter

Planned replacement pays dividends

Making better products to make other products better

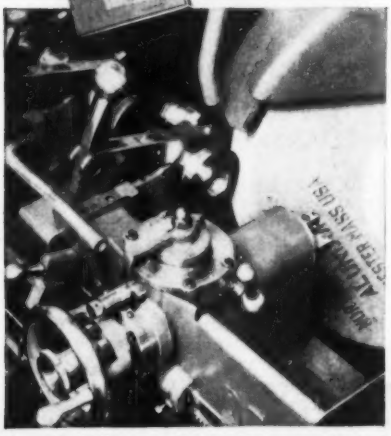
Save 3 Ways..in Time..in Effort..in Space!



NORTON 6 x 18″ Angular Wheelslide Semiautomatic Machine

Catalog 533-1 provides details. Write for your copy.

Catalog 1793-1 provides details. Write for your copy.



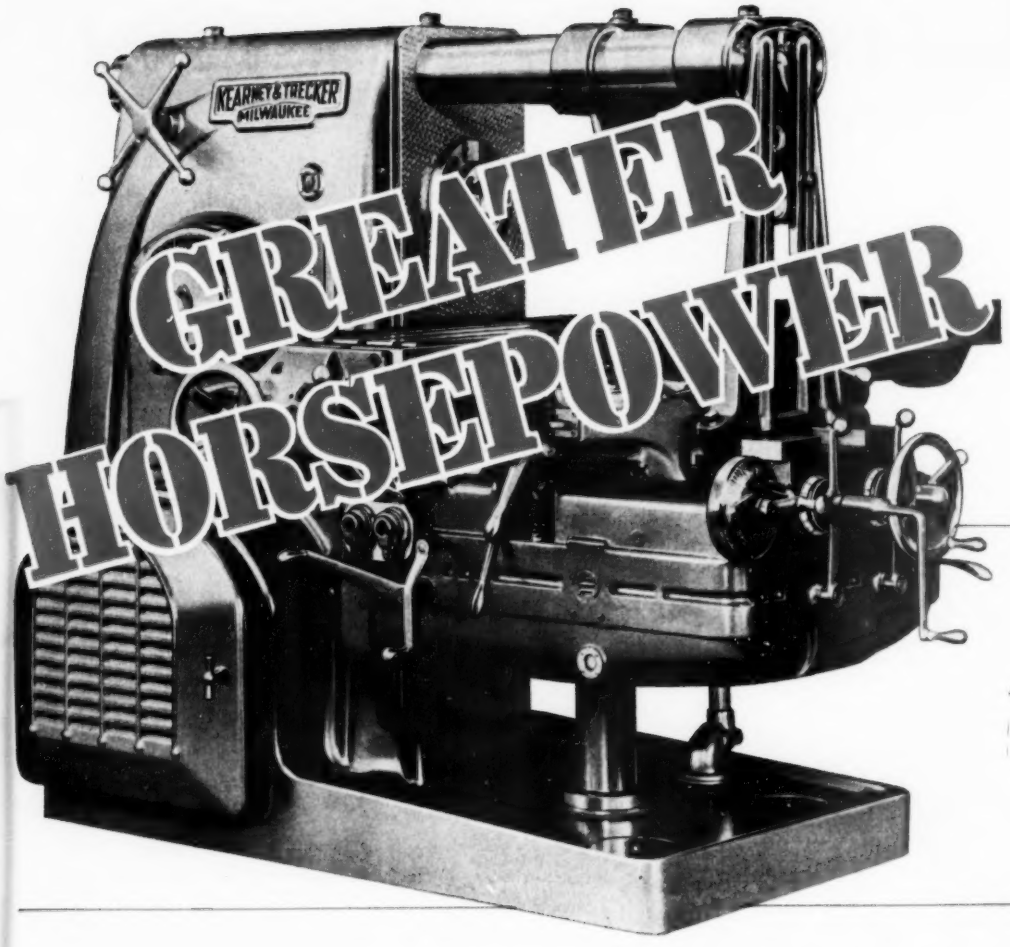
Norton 10 x 36″ Angular Wheelslide Semiautomatic Machine grinding crankshaft flange face and two diameters

A THREE-WAY saving in time, labor and floor space is possible for your plant with the Norton Angular Wheelslide Machines. The 6 x 18″ and the 10 x 36″ Angular Wheelslide Semiautomatic Machines have a 30° feeding action to permit grinding both shoulders and diameter simultaneously with a single automatic feed cycle. This eliminates one handling plus the labor of shoulder bumping which is required by conventional two-operation methods. If you have such grinding operations in your plant, it will pay you to study the performance records of these Norton Grinders. A Norton Engineer will be glad to help you with your grinding problems. Please address your request to: Machine Division, Norton Company, Worcester 6, Mass.

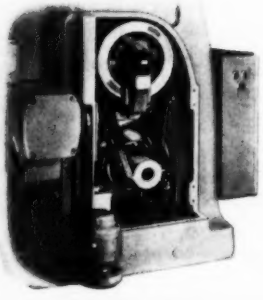
M-590

NORTON

NORTON COMPANY, WORCESTER 6, MASS. · Warehouses in Five Cities · Distributors in All Principal Cities



GREATER HORSEPOWER

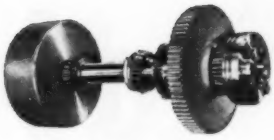


KEARNEY & TRECKER MILWAUKEE **CK's**

With the broader use of carbide and cast alloy tools for milling ferrous and non-ferrous materials, progressive shop men have demanded *greater horsepower* to take fullest advantage of these tools. Kearney & Trecker's new CK milling machines meet this demand. Depending on machine size, (No. 2, 3, 4, 5, or 6) you get 10 to 25 hp independent motor spindle drive plus separate 3 to 5 hp feed and rapid traverse drive. Spindle and feed motors are interlocked with positive automatic safety control for overload conditions. No danger of stalling cutters in cut. Added to *greater horsepower* are the many other pace-setting CK features — that give you the most productive, profitable milling machines you can buy today — anywhere!

Replacement of obsolete machine tools is an

GREATER RIGIDITY — Yes, these new CK columns are the most rigid milling machine columns we've ever designed! They give you 1000 pounds more metal scientifically distributed in heavier ribbing, box section, sponson construction . . . to effectively absorb vibration from heaviest cutting loads.

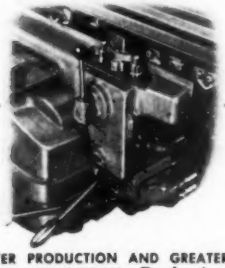


GREATER CUTTING EFFICIENCY — Added momentum of spindle-mounted flywheel assures longer cutter life and greater efficiency, through smoother, more positive drive — a key to most efficient use of modern cutting tools. Spindle rigidly supported by Kearney & Trecker's original 3-bearing design.

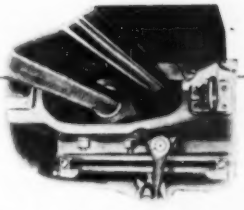
GREATER ADAPTABILITY — No. 60 Heavy Duty drive flange on Nos. 4, 5 and 6 machines enables use of heavy duty arbors with flange drive for large single or multiple cutter setups; or bolting large face-milling cutters directly to spindle nose. Average setups use standard arbors with No. 50 spindle drive.

NON-GLARE RAPID-SET DIALS—You'll avoid costly errors in reading and setting these new micrometer dials. They're vapor blasted to give you a satin surface with high contrast markings. They're easy and quick to set and provide positive lock at every setting.

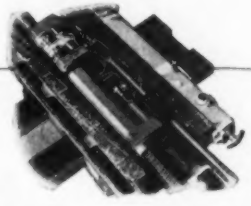
FEEDS AND SPEEDS TO TAKE FULL ADVANTAGE OF MODERN CUTTING TOOLS — and you really can do it with the broad feed and speed ranges on Kearney & Trecker's new CK milling machines. You get 24 spindle speeds (15 to 1500 rpm on Nos. 2 and 3, 13 to 1300 rpm on Nos. 4, 5 and 6) with Kearney & Trecker's automatic protecto-mesh shift to eliminate gear clashing. And there's the extra-wide feed range — 32 changes from ¾" to 90" per minute—with separate 3 or 5 hp feed and rapid traverse drive.



GREATER PRODUCTION AND GREATER OPERATING CONVENIENCE—Production men will like Mono-Lever Control because it reduces idle cutter time, shortens floor-to-floor cycle time on both long and short run lots. Operators will like it because it makes faster, simpler, less fatiguing work for them.



SMOOTHER FEED PERFORMANCE — with a new design 2" diam. heavy-duty, table feed screw that affords greater bearing contact and runs through an extra-long table feed nut. These new CK machines are equipped with a backlash eliminator for more effective climb milling, more accuracy and longer screw life.



GREATER MACHINE LIFE — through automatic lubrication and generously proportioned gears and shafts throughout for overload conditions. There's a forced flood system in the column and knee, and a positive metered, pressure pump system for table, saddle and knee ways, and table feed assembly.

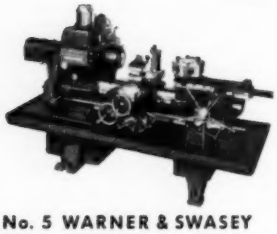
Kearney & Trecker's new CK Line is designed to meet every demand of present-day milling operations . . . making CK machines more accurate, and MORE PRODUCTIVE for you. Contact your nearest Kearney & Trecker representative or write direct to obtain complete specifications of these fine new machines. See how they easily replace obsolete machines at substantial savings to you. Kearney & Trecker Corp., 6784 W. National Ave., Milwaukee 14, Wis.

KEARNEY & TRECKER
MILWAUKEE
MACHINE TOOLS

investment that makes Dollars and Sense.

from 2" to ½" with

¾" depth of cut on No. 5 Warner & Swasey holds limits of ±.001"



No. 5 WARNER & SWASEY

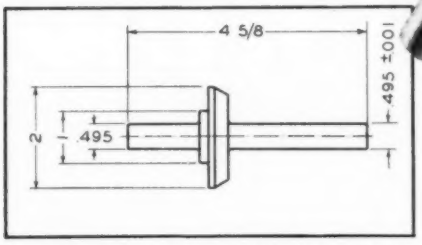
The O. C. Keckley Company, Chicago valve manufacturer, machines the Valve Stem of their Type 410 Stainless Steel Valve, reducing the diameter from 2″ to ½″ with *one* pass of a Warner & Swasey Single Cutter Bar Turner. Spindle speed is 274 RPM, Feed: .012″. The limits on this operation are ± .001″.

You must have the best in machine tools to turn out jobs like this. Power, alone, is not enough. The machine and tools must be designed to provide maximum rigidity for heavy carbide cuts, as well as to have a surplus of power.

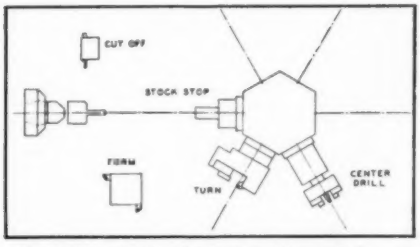
Keckley found out that Warner & Swaseys are the answer to their problem jobs. Why not see what Warner & Swasey Turret Lathes can do for you? Call your nearest Field Representative or write

TURRET LATHES, MULTIPLE & SINGLE SPINDLE AUTOMATICS,

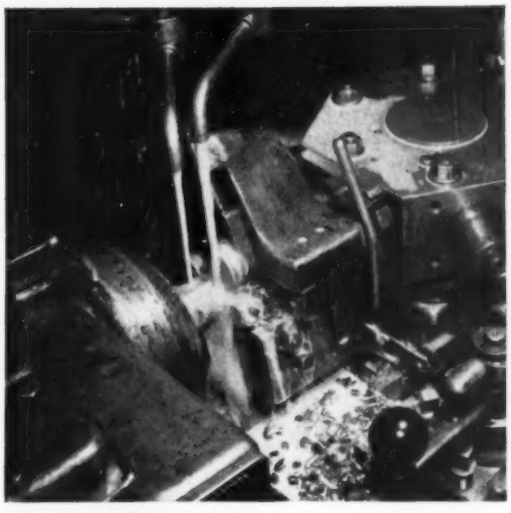
one cut!



THE PART—*Type 410 Stainless Steel Valve made by O. C. Keckley Co.*



THE METHOD—*Tooling Setup of the Warner & Swasey No. 5 Turret Lathe that produces this part. Standard Tools are used.*



THE OPERATION—*Diameter of 2" bar is reduced to ½" in one cut, and .001" limits are held.*

WARNER & SWASEY SELLS ONE THING...
INCREASED PRODUCTION

WARNER & SWASEY
Machine Tools
Cleveland

PRECISION TAPPING AND THREADING MACHINES

Identical
Twins..

■ or Rugged Individualists?

Look Closely at these 2

MORSE TWIST DRILLS

At first glance, they look alike. But look again, and you'll see a difference. The drill at the right, with a 90° point angle and highly polished flutes, is specially designed for plastics. The drill at the left, having a 118° point angle and highly polished flutes, is for use in brass.

This is the obvious. Laboratory examination will reveal differences in hardness, flute contour, land width — all necessary in terms of the job each drill is destined to do.

Now you can see the care with which Morse Cutting Tools are *engineered — individually* — for every purpose . . . why they give top production and consistent accuracy on every job. And if you need even greater production, specify MORSE — Electrolized!

Remember that Morse Quality is sold *only* by your Morse-Franchised Distributor . . . and call him on *all* your cutting-tool orders.

Morse Twist Drill & Machine Co., New Bedford, Massachusetts (Div. of Van Norman Co.)

Branch Warehouses in New York, Detroit, Chicago, San Francisco

MORSE

CUTTING TOOLS

WINTER BALANCED ACTION TAPPER TAPS

FOR BETTER SIZE CONTROL

in tapping operations, always specify Winter "Balanced Action" Taps. Uniform flute contours, insured by precision grinding, combine with exact flute spacing to maintain the accuracy required for close size control of tapped holes. The complete Winter "Balanced Action" line includes pulley, chip driver, hand, machine screw, pipe, nut, and tapper taps. They are stocked conveniently near you at Winter branches in New York, Detroit, Chicago, and San Francisco.

WINTER BROTHERS COMPANY, Division of the National Twist Drill and Tool Company, Rochester, Michigan, U. S. A.

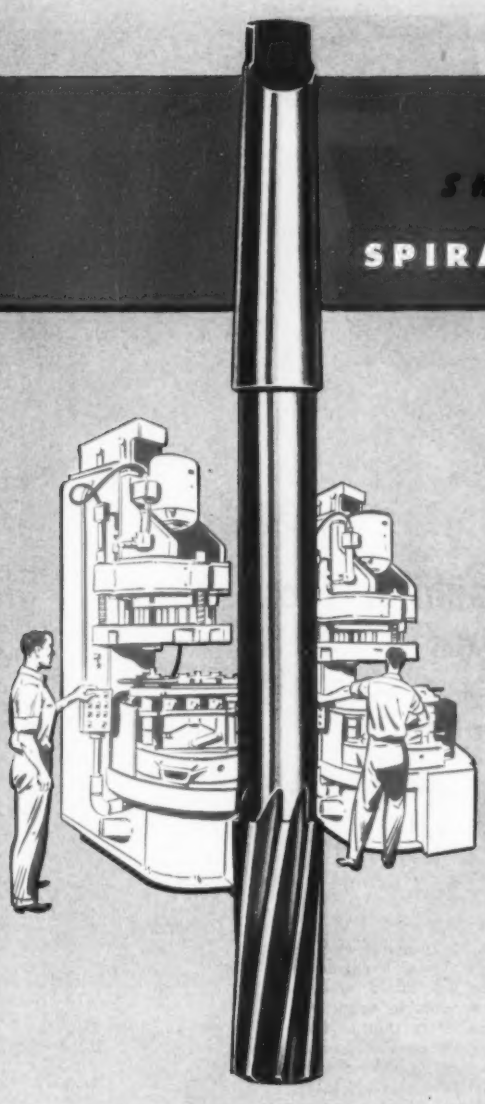
ALWAYS AT YOUR SERVICE

YOUR LOCAL DISTRIBUTOR carries a complete stock of WINTER Taps on his shelves—as close to your tapping problems as the telephone on your desk.

WINTER BROTHERS COMPANY

WINTER

NATIONAL
SHEARING ACTION
SPIRAL FLUTED REAMERS



REAMING WITHOUT CHATTER

in deep, small diameter holes is easy when you use National "Shearing Action" Spiral Fluted Reamers. As with all reamers bearing the National name, you can be sure of smooth finish and exact tolerances. "Shearing Action" is a plus value you get in National cutting tools. The complete line includes reamers, end mills, twist drills, milling cutters, counterbores, hobs, and special tools. They are stocked conveniently near you at factory branches in New York, Chicago, Detroit, Cleveland, and San Francisco. NATIONAL TWIST DRILL AND TOOL COMPANY, Rochester, Michigan, U. S. A.

"CALL YOUR DISTRIBUTOR"

It is National's firm belief, based on long experience, that the local industrial distributor is the one best source for all staple industrial needs—including NATIONAL Metal Cutting Tools.

NATIONAL TWIST DRILL & TOOL CO. ROCHESTER, MICH. U.S.A.

National

1st european machine-tool exhibition

Organised by the european comittee of co-operation of machine-tool industries

1-10 september 1951

PARIS

Parc des Expositions - Porte de Versailles

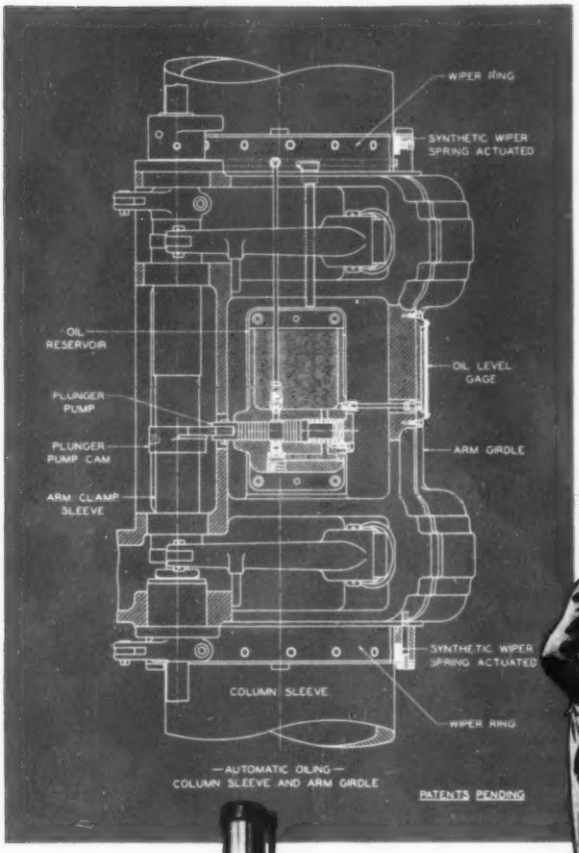
More than 600 exponents belonging to 12 European and American Nations, over 2.000 machine-tools in working order. The 1951 European Machine-Tool Exhibition will afford to eventual buyers of the whole world an eminently suitable opportunity to compare and to choose in the course of a stay in Paris at a particularly pleasant period of the year, the equipment which will suit best to their needs, among the widest range of machines ever shown before.

For Information, Invitation Cards, Travelling and Hotel Reservation please write to : 1ère EXPOSITION EUROPÉENNE DE LA MACHINE-OUTIL - 2 bis, rue de La Baume, Paris 8e - FRANCE

Just a memory now

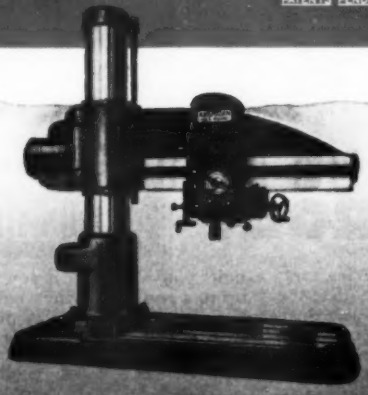
Column Scoring a thing of the past...

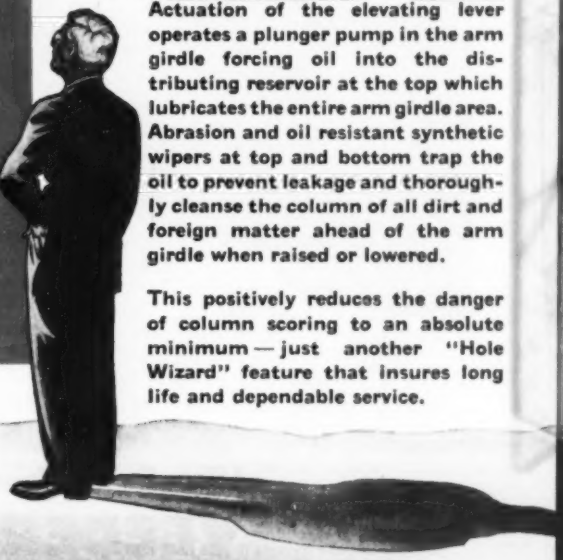
We've done something about it—



On the new "AMERICAN" Hole Wizard Radial the arm girdle and its mating column area are automatically oiled and cleansed. Actuation of the elevating lever operates a plunger pump in the arm girdle forcing oil into the distributing reservoir at the top which lubricates the entire arm girdle area. Abrasion and oil resistant synthetic wipers at top and bottom trap the oil to prevent leakage and thoroughly cleanse the column of all dirt and foreign matter ahead of the arm girdle when raised or lowered.

This positively reduces the danger of column scoring to an absolute minimum — just another "Hole Wizard" feature that insures long life and dependable service.



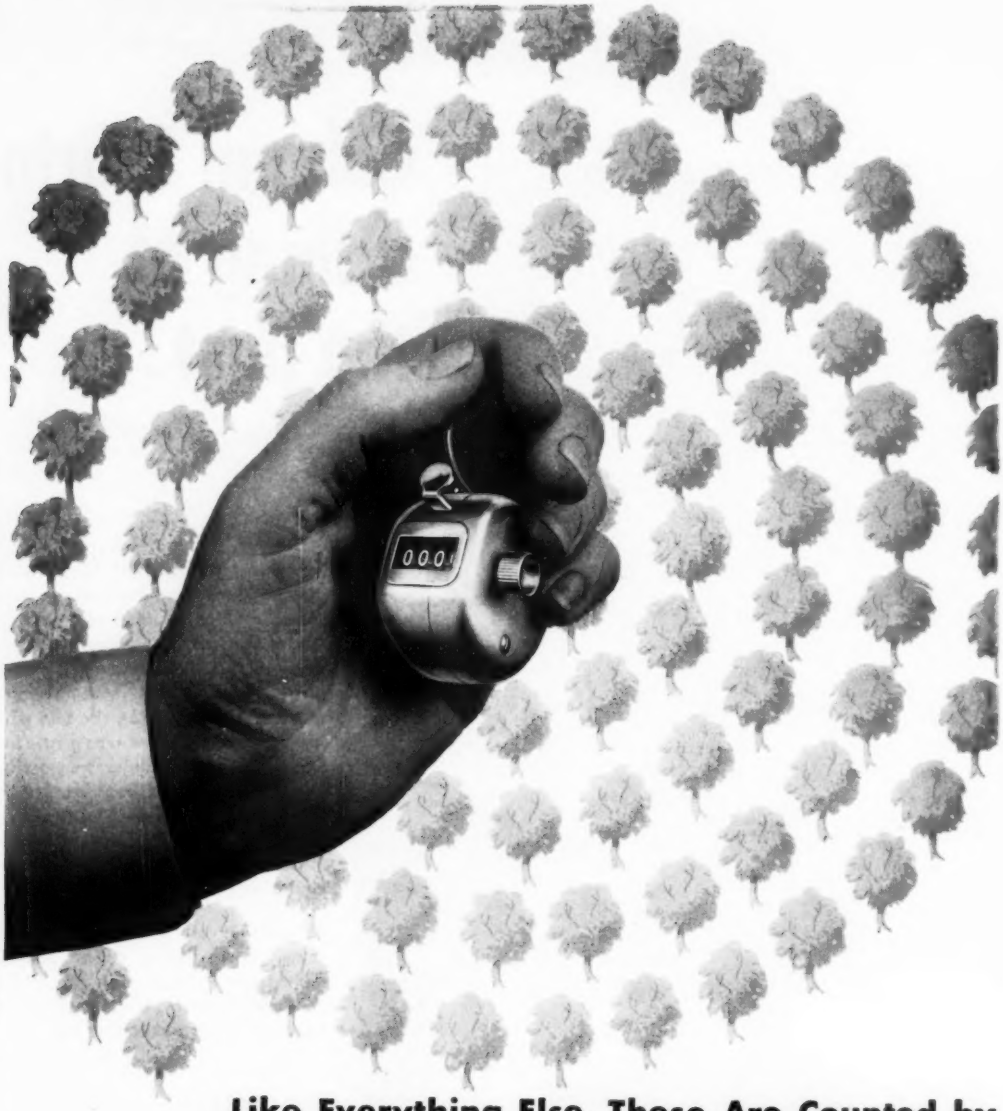


Bulletin No. 327 describes this and other exclusive "Hole Wizard" features of proven value. Want one?

THE AMERICAN TOOL WORKS CO.

Cincinnati, Ohio, U. S. A.

LATHES AND RADIAL DRILLS



Like Everything Else, These Are Counted by

VEEDER-ROOT COUNTERS

Name it and you can count it...trees, cars, people . . . and many other units that are difficult to count in any other way than with a Veeder-Root Hand Tally...on which you simply press the thumb-lever once for each count.

And in addition, there are many other Veeder-Root Counters which count mechanically and electrically in any terms or units you want. But if you want to count up to a *real* payoff, then build V-R Counters into your machine or product as original equipment. *How to do it?* Write and find out:

VEEDER-ROOT INCORPORATED
HARTFORD 2, CONNECTICUT

Greenville, S. C. • Montreal, Canada • Dundee, Scotland • Offices and agents in principal cities

REMARKABLE STABILITY

.003" RANGE

ACTUAL SIZE
9" x 7¾" x 8½"
WEIGHT 17¾ LBS.

New FEDERAL Air Gage!
The DIMENSIONAIR!
Use it under oil or coolants!

OUTSTANDING PERFORMANCE describes what this new air gage can do — and that's no exaggeration!

EXCEPTIONAL MEASURING RANGE .003" — *three times more* than that of any air gage heretofore. You can determine the size of a hole long before it reaches the size required — no longer any oversize holes. The greater range also makes it possible to gage irregular and tapered holes which formerly were impossible to measure.

STABILITY IS UNEQUALLED — no drift of the indicator hand; hours — days — or weeks after. The jeweled meter is cushioned at both ends to eliminate damage. No sticking.

POSITIVE INDICATOR SETTING in a few seconds — simplest of all to set up. No master jet adjustment. Ask the man who usually sets your air gages to set this one and hear what he says.

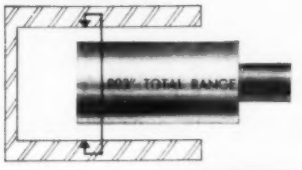
IT READS .00005" *directly.* Not a "go — no go" gage. Only *one* master required. Tolerances are set up on the dial directly just as on a Dial Indicator. Insert plug in hole with jets at *any position* — it makes no difference.

ANY PRESSURE FROM 40 to 100 POUNDS. Normal pressure fluctuations do not affect its accuracy. Smallest centralizing error of any air gage — so small other gages not even sensitive to it.

USE IT UNDER OIL OR COOLANTS. Greater jet pressure, larger orifices and *extra clearance* enable the plug to be used at production. Grit, dirt, and rough handling won't interfere or clog it.

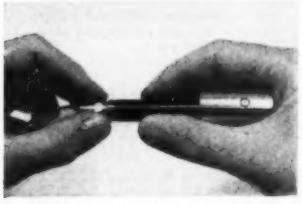
DEEPER RECESS CLEARANCE — chrome plated plugs — longer wear; finger-tight hose and plug connections; non-corrosive, vinylite plastic hose; and many other outstanding performance features make this Federal Dimensionair an air gage which will not only amaze you but will pay off in better, more positive gaging.

Those who already use it say it's way ahead. Write for a free demonstration. You owe it to yourself to see the Dimensionair. FEDERAL PRODUCTS CORPORATION, 1122 Eddy Street, Providence 1, Rhode Island.



Exceptional measuring range • Greater plug clearance • Jets can be at any position • Longer plug wear.

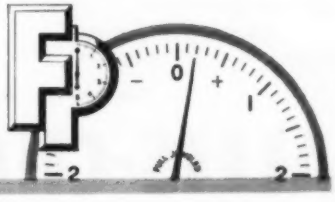
Outstanding stability • Quick, positive setting • No drift • No sticking.

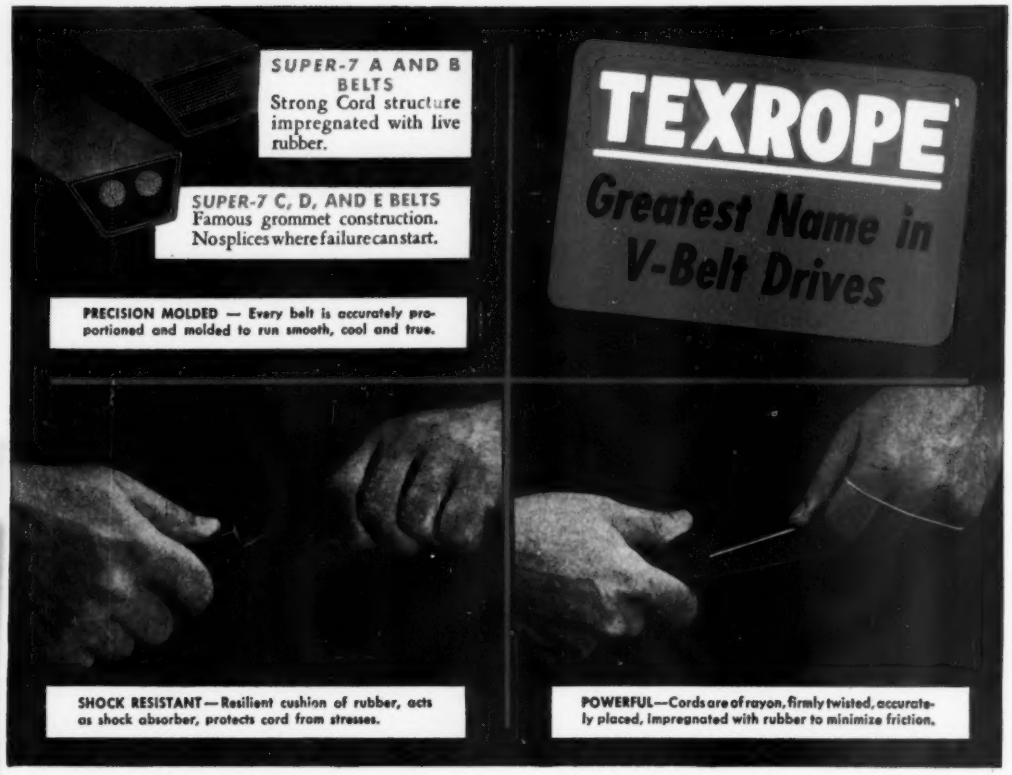


Finger-tight connections for plug and hose. Non-corrosive vinylite hose.

FEDERAL

Largest manufacturer devoted exclusively to designing and manufacturing *all types* of DIMENSIONAL INDICATING GAGES




SUPER-7 A AND B BELTS
Strong Cord structure impregnated with live rubber.
SUPER-7 C, D, AND E BELTS
Famous grommet construction. No splices where failure can start.
PRECISION MOLDED — Every belt is accurately proportioned and molded to run smooth, cool and true.
TEXROPE
Greatest Name in V-Belt Drives
SHOCK RESISTANT — Resilient cushion of rubber, acts as shock absorber, protects cord from stresses.
POWERFUL — Cords are of rayon, firmly twisted, accurately placed, impregnated with rubber to minimize friction.

Cool Running... LONG LIVED!

SUPER-7 V-belts give long, satisfactory service even under bad conditions of load, shock and grit.

Tough, double-wrapped cover bias cut for elasticity and impregnated with rubber. Effectively seals out dust, grit, moisture; takes the wear; keeps the belt in shape; and protects cord structure.

But you get more than good belts when you standardize on *Super-7* V-belts. You also get the benefit of the greatest V-belt experience in the world both in the field and factory. You are assured of exactly the right drive for longest life from the wide variety of types and sizes available.

High Capacity Belts

Where space is limited or other special conditions demand heavier duty, the high capacity belt can be furnished in A, B, C, D, and E sections . . . Extra strong cords, special rubber cushion and tough Neoprene cover give them 40% greater capacity than standard belts at proportionately higher price.

V-Belt Drive Headquarters

Your nearby Allis-Chalmers Authorized Dealer or Sales Office can serve all your V-belt needs, whether they be new or replacement V-belts; standard and variable speed sheaves; or speed changers.

Get your copy of the revised 120 page *Texrope* Pre-Engineered Drive Manual from your A-C Dealer or Sales Office or write for Booklet 20B6956A. Allis-Chalmers, Milwaukee 1, Wisconsin.

A-3291

Texrope and *Super-7* are Allis-Chalmers trademarks.

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Applied . . .
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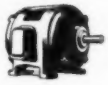
by Allis-Chalmers Authorized Dealers, Certified Service Shops and Sales Offices throughout the country.



MOTORS — ½ to 25,000 hp and up. All types.

CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

PUMPS — Integral motor and coupled types from ¾ in. to 72 in. discharge and up.

ALLIS-CHALMERS

Production Pointers from GISHOLT

COST CUTTING IDEAS

Gisholt—A Unique Service in the Machine Tool Industry. Here you obtain unbiased help on your turning problems, because Gisholt's broader range of equipment includes both manually operated turret lathes and automatic lathes. Gisholt's recommendations are made without prejudice for one type of machine over another.

BEARING CAPS... CHEAPER BY THE HALF-DOZEN SIZES

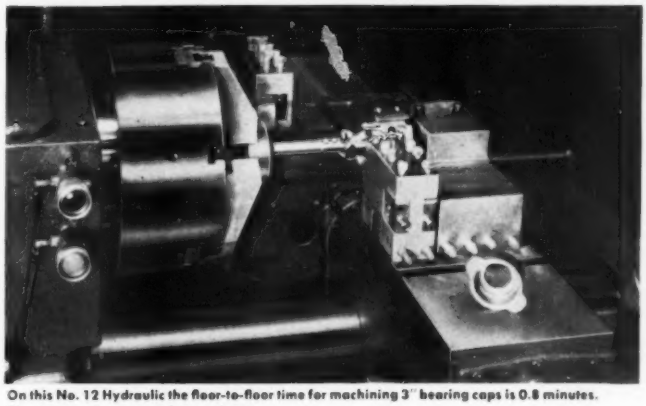
on a No. 12 Hydraulic Lathe

Smart engineers put on their thinking caps and came up with this better way of producing bearing caps in 6 sizes, using only one No. 12 Hydraulic Automatic Lathe.

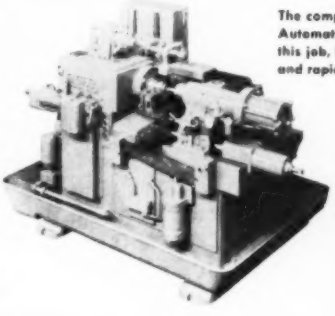
The trick was to get fast machining *and* changeover from one size to another—to keep all sizes coming fast! Here's how it's done!

The caps are held in a 12-inch, 3 jaw air chuck with special jaws for locating. The small bore is the most critical and requires the most accurately held dimension. Rough and finish cuts are made independently of each other and without interference from other tooling. Following these, two additional counterbores are finished.

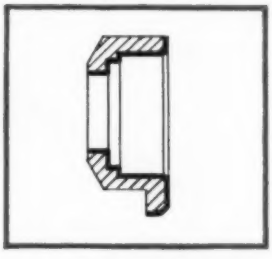
Then, the OD of the lugs is turned, and the open side of the head is faced and chamfered. Time for the entire job on the 3-inch cap is a quick 0.8 minutes! Speed on the other caps, which range up to 6 inches, is equally fast.



On this No. 12 Hydraulic the floor-to-floor time for machining 3" bearing caps is 0.8 minutes. The 6 sizes of caps are shown above.



The compact Gisholt No. 12 Hydraulic Automatic Lathe, such as used on this job, features simplicity of tooling and rapid changeover.



Rapid Changeover

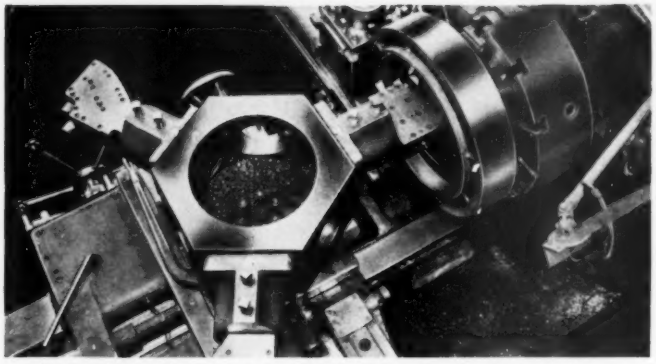
The quick, simple changeover of the No. 12 Hydraulic is an important feature for continuous high-volume production of all 6 sizes of the cast-iron bearing caps. The machine is equipped with a variable speed motor drive, providing a variation in spindle speeds of from 185 to 380 r.p.m., so that the most efficient cutting speed for each part is instantly obtained by merely setting a rheostat. No changing of drive pulleys or speed gears is needed. Well-planned tooling and accessible machine adjustment further add to the speed and ease of changeover.

GEAR PRODUCTION DOUBLED BY DOUBLING CUTS

Both Turrets of Saddle Type Turret Lathe Used to Maximum

Take the best in turret lathes . . . add a well-planned tool set-up and you're all set to topple high job-time and costs.

That's what this manufacturer did in the machining of bull gears. The job was given to a Gisholt 3L Saddle Type Turret Lathe with tooling expertly planned to take maximum advantage of both the longitudinal and cross movements of the hexagon turret. Several cuts are made simultaneously at every stage of machining.

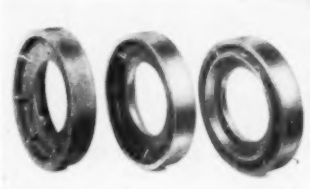


The set-up that saved! This view shows how both turrets work simultaneously to make time on bull gear job.

Cross Feeding Hexagon Turret Pays Off

Turret face No. 1 gives two different bores and at the same time a rough turn is made from the square turret. In the 2nd turret position three different facing cuts are made simultaneously and the back facing is done by the square turret. The 3rd position provides two different bores and two chamfers with the hexagon turret and a finish turn of the O.D. from the square turret.

Net result of this 3L Turret Lathe job with smart tooling: floor-to-floor time cut from 28 to 12 minutes!



These 20" bull gears are given the rush act by a 3L Turret Lathe with expertly planned tooling.

CROSS HOLE DRILLING ON LATHE SAVES ADDED OPERATION, OPERATOR

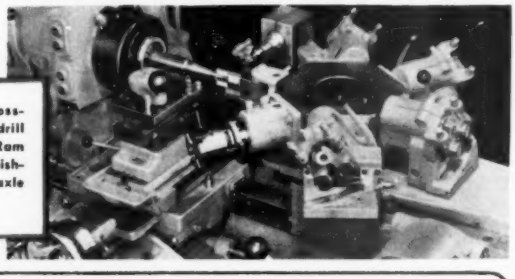
Here's Machining and "Hole-in-One"!

Here's a production pointer that pays off big in maximum parts per hour—minimum cost.

The job is machining axle shafts which require end cross holes. Instead of doing only the finishing operations on the lathe, and then moving the shafts to another station and operator for drilling, this manufacturer does the whole job at once.

A small air motor is mounted at the rear of the cross slide on the Gisholt No. 5 Ram Type Lathe. After machining is completed, the drill comes in to drill the cotter keyhole. The drill is guided by a drill jig mounted in the duplex tool holder on the turret station preceding the die head (see photo). Floor-to-floor time is only 4.3 minutes.

This little stunt pays off more than in just saving an extra operation, operator and in handling time. By doing the cross-hole drilling on the lathe, the die head which follows corrects any distortion of the surface and removes the drill-hole burr. It assures a good job without further inspection, hand scraping or burring.



Tooling and cross-slide mounted drill on the Gisholt Ram Type Lathe for finishing and drilling axle shafts.

HAVE YOUR "EQUIPMENT REPLACEMENT ANALYSIS" FORMS?

Here's real help in determining when and what old machine tools should be replaced. Gisholt has made up the "Equipment Replacement Analysis" form (as determined by MAPI formula) into a complete 4-page folder with step-by-step instructions. Write for your free copies today!

GISHOLT

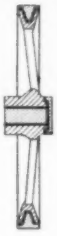
OVER-AGE MACHINE TOOLS MEAN

WORTH OUT OF MAN-HOURS

GISHOLT COST CUTTING IDEAS

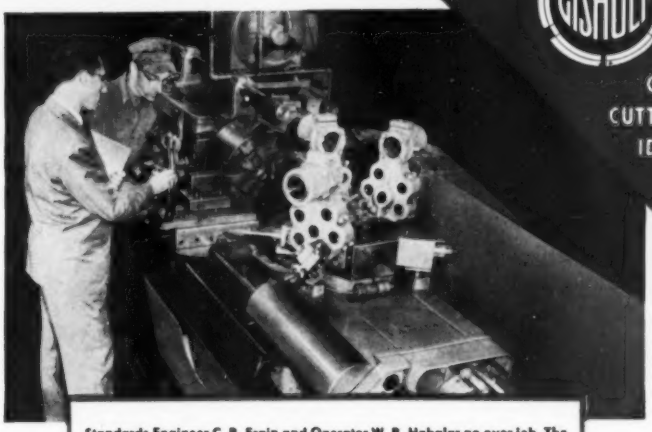
FASTERMATIC "MAKES HAY" ON HAY BALER PARTS

Saves 1500 Hours Per Year!



See this sheave? It's a small but vital part of the hay balers built by New Holland Machine Company, New Holland, Pa.

By old machining methods, 2 operations and 11.88 minutes were needed to ready the 12¾ inch sheaves for the balers. Too slow and costly, New Holland engineers figured. So they looked for a better way of doing the job—and found it: in a Gisholt 2F Fastermatic Automatic Lathe.



Standards Engineer C. R. Frain and Operator W. R. Habalar go over job. The Fastermatic with this tool set-up upped sheave production 63%.

Time Slashed 37%

Now, the entire job is done in *one* operation—and floor-to-floor time is cut from 11.88 minutes to only 7.5 minutes. Machining time is only 4.6 minutes. Moreover, the operator is free to handle other machines now because of the completely automatic cycle of the Fastermatic. He is needed only for loading and unloading the machine.

Figured by the year, the time saved by the Fastermatic reaches the impressive total of 1496.5 hours! Mighty important in these days of labor shortages and the need for higher production.

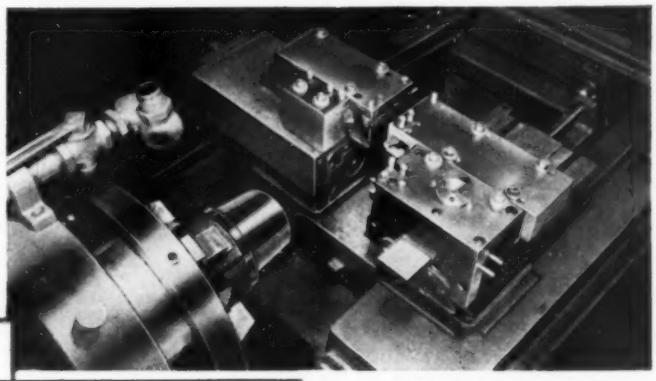
ROUGH, TOUGH, STEEL CASTINGS A SNAP FOR SIMPLIMATIC

Lot of Stock Removed in Little Time

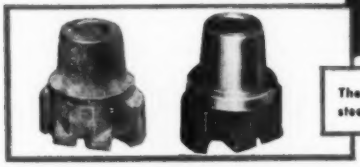
The special talents of the Simplimatic are paying big dividends on this job—machining 4 sizes of drill bit bodies.

Being steel castings and irregular shaped, they are not only hard to machine, but also difficult to hold. For a firm grip on the bit bodies, a duplex air chuck is used. This is a 4 jaw chuck with the jaws arranged in two pairs, each operated by its own piston in a duplex air cylinder. The work is therefore centered in two cross-wise directions while 4 jaws rigidly hold it during machining operations.

The flat platen of the Simplimatic with its independent tool slides permits a very compact and effective tooling arrangement with minimum tool overhang. The tooling, as worked out, gives simultaneous machining of a combination of straight and taper-turned diameters, two straight faces, an outside bevel and an internal chamfer. Floor-to-floor time ranges from 3 to 6 minutes for the A.P.I. pin sizes from 3½ inches to 6⅝ inches. A second operation is performed, finishing the same surfaces and using the same machine and tooling.



Simplimatic tooling for machining cast steel drill bit bodies.



There are only 6 minutes between this rough steel casting and machined drill bit body.

UNDER-PAR EFFICIENCY...*REPLACE NOW!*

GISHOLT

GISHOLT

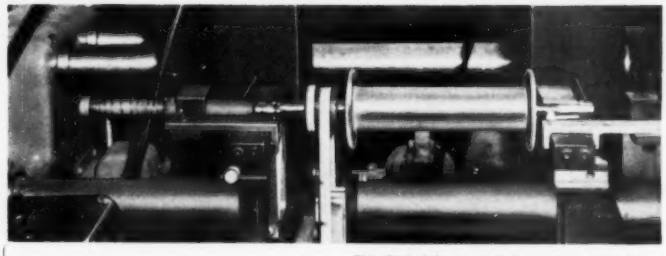
COST CUTTING IDEAS

HIGH-SPEED TEXTILE MACHINES WHIRL FASTER WITH BALANCED BOBBINS

Balancing Is Moral of this "Yarn"

Today, one modern high-speed textile machine would out-produce a whole army of women at old-time spinning wheels. One important reason for the amazing speed of present textile machines is the precision balancing of rotating parts on Gisholt Balancing Machines. In fact, precision balancing of bobbins, spindles, flanged spools, etc., on Gisholt 1S Balancing Machines has made possible many important savings. To mention only a few, there are faster operating speeds, improved yarn quality and reduced textile machine maintenance.

An enlightening article on balancing and the major role it is playing in the textile industry was carried in a past issue of *Textile Industries*. Entitled "Dynamic Balancing of Machinery," it was prepared by a high-ranking authority in the textile industry. Reprints of this article are available by writing Gisholt at Madison.



This Gisholt Dynamic Balancer is used to determine the amount of unbalance in a textile spool. (Photos courtesy *Textile Industries*.)

This picture shows a variety of spools which are dynamically balanced on Gisholt Machines for higher speeds.

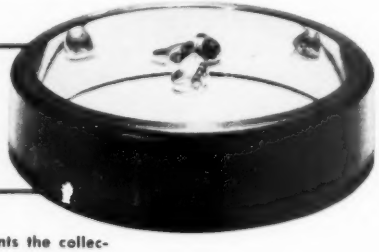
MIRROR FINISH...NOT WHAT IT'S CRACKED UP TO BE

Or, There's More Here Than Meets the Eye!

It's not enough merely getting the finish in micro inches a drawing calls for. You still don't have assurance that the part will have the long life you want from it. The finishing *method* is fully as important as the *degree* of smoothness of the surface

If your finish is obtained by Superfinishing (as it was in this unretouched photograph), you are reflecting from true base metal. Smear metal chatter marks and grinder flats are all removed. What you actually have are surfaces equal to broken-in surfaces—right as to dimension. These surfaces will last indefinitely.

Superfinish is the successful method of solving problems of both wear and surface roughness. It's covered fully in an 80-page book, "Wear and Surface Finish," which will be sent you free by writing.



Note multiple reflections of finger ring on Superfinished ID of bearing. No smear-metal, chatter marks or grinder flats in this more nearly perfect geometrical surface.

No. 251 564

The Gisholt Round Table represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

GISHOLT MACHINE COMPANY
Madison 10, Wisconsin

A general catalog on machines listed below is available on request.

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

You owe it to yourself to learn more about this remarkable hammer . . .

Write for Bulletin 11-L-O

CECO-DROP

• *The Boardless Gravity Drop Hammer* •

No Boards • No Front Rod • No Back Rod
Costs less to operate . . . Forges more minutes per hour . . . Is safer and easier to operate . . . This hammer is setting new records in cutting forging costs and in increasing production.

CHAMBERSBURG ENGINEERING CO., CHAMBERSBURG, PA.

DANLY PRESSES

REQUIRE LESS MAINTENANCE...

... at International Harvester's East Moline works — where performance is a matter of careful record!

International Harvester Corn Picker

The 400-ton Danly Straight Side Press shown at right has required an amazingly small amount of maintenance work—an average of less than 2½ hours a week over the last twelve months. And a large portion of this time was consumed by routine press attention such as oiling and adjusting.

Write today for your copy of the Danly Straight Side Press Catalog and see how unique Danly Press construction and design features will achieve similar press operating cost reduction for you.

1.

2.

1. **QUALITY CONTROL** procedures are highly developed in the Harvester production system. Parts from every press are completely checked at least once each shift and with every die change. Charts like the one shown here hang at each machine station and provide a complete running record for statistical analysis purposes.

2. **MAINTENANCE RECORDS** are maintained separately for every machine, providing an exact and complete history of required repair work. Each card identifies the machine, shows its location and describes any special characteristics. Maintenance work is tabulated currently by job description, date and hours required.

STAMPING A VARIETY OF PRODUCTS on a steady production schedule is the job of this 400 ton Danly Straight Side Press. Here, a wagon elevator bottom for corn picker assembly is being formed at a rate of more than 1200 per eight hour shift. Operators like this Danly press because it is smooth and quiet, taking even top capacity jobs easily.

DANLY

®

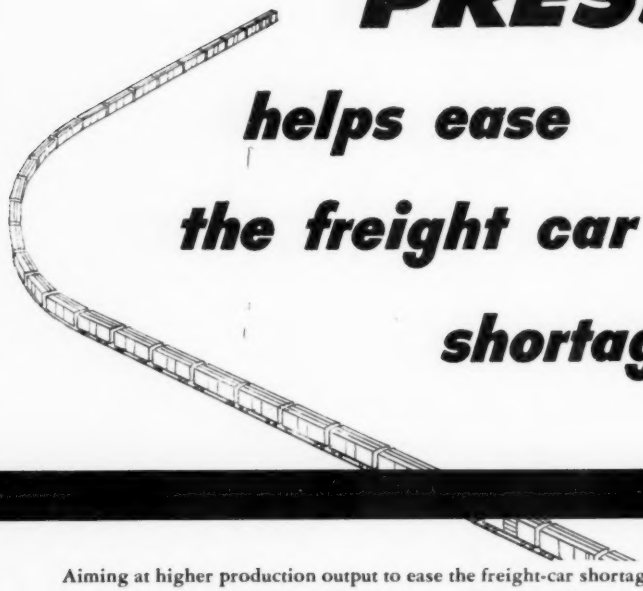
Mechanical Presses . . . 50 to 3000 tons

SEND FOR YOUR COPY TODAY!

DANLY MACHINE SPECIALTIES, INC.
2100 SOUTH LARAMIE AVENUE
CHICAGO 50, ILLINOIS

This BALDWIN PRESS

helps ease the freight car shortage



Aiming at higher production output to ease the freight-car shortage, this leading manufacturer recently installed a Baldwin Press. Reports indicate that this press is earning top honors as the most versatile, profitable and helpful piece of equipment in the shop.

Many manufacturers throughout the country have learned from experience how the features of Baldwin Presses pay out in greater output, fewer rejects, and all-round lower costs. The adjustable ram stroke and press pressure . . . the full-pressure capacity throughout the entire stroke . . . the positive overload protection . . . the automatic slow-down . . . the quick, simple die set-up . . . these are only a few of the many outstanding advantages that make Baldwin Hydraulic Presses economical production aids.

If you are thinking about installing a new press or replacing an old one, send for our bulletin 285. It gives a concise story on what Baldwin has to offer . . . a variety of presses for forming and drawing . . . forging . . . extrusion . . . plate work . . . and dozens of other miscellaneous applications. No matter what your press need, you'll find it profitable to talk to Baldwin.

BLW
THE BALDWIN GROUP

BALDWIN HYDRAULIC

BALDWIN-LIMA-HAMILTON CORPORATION, PHILADELPHIA 42, PA., U. S. A.

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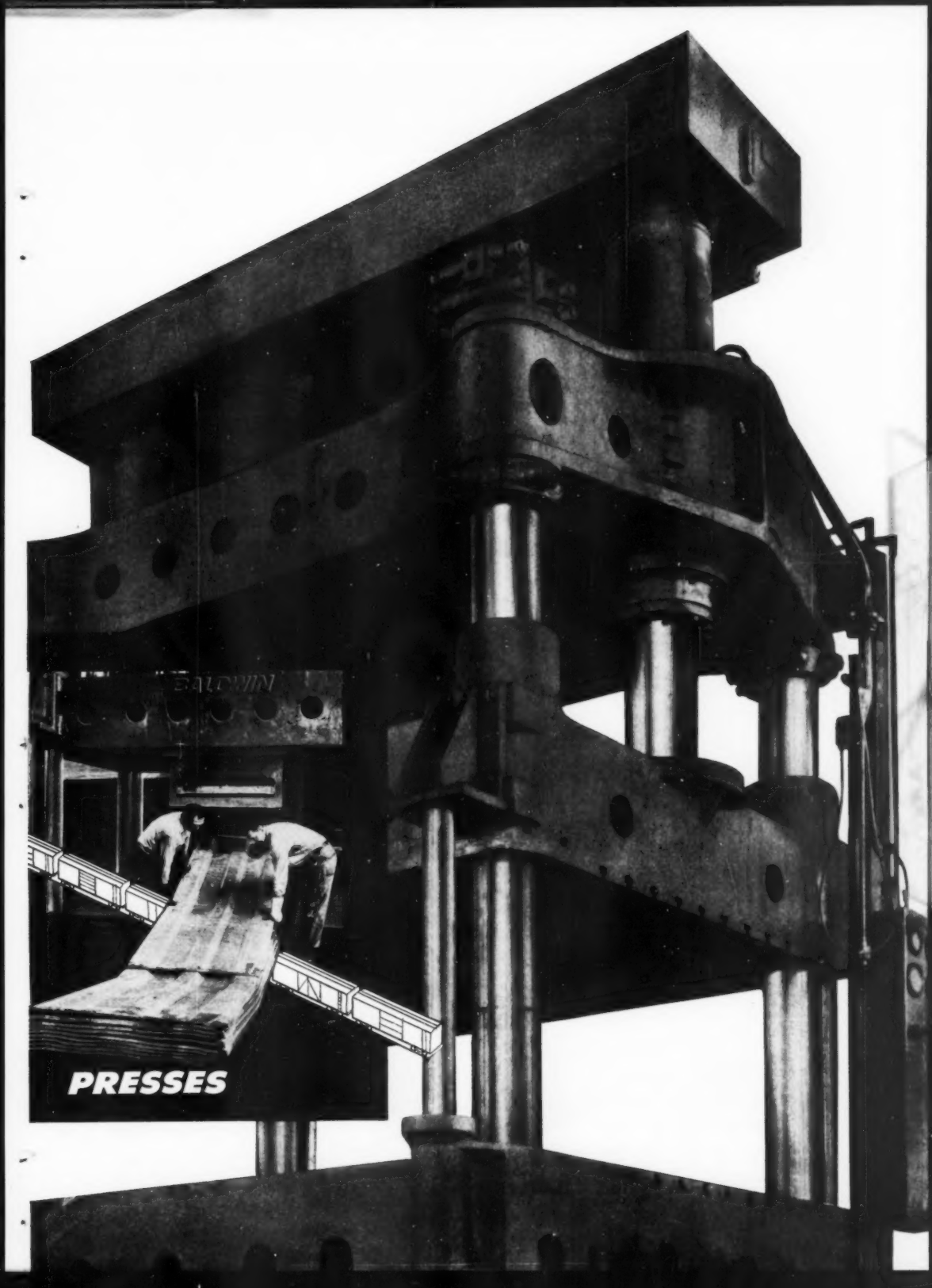


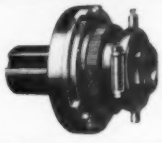
PRESSES

IF IT'S DODGE -IT'S DEPENDABLE!

TAPER-LOCK SHEAVES: A Dodge "first." Patented. (Taper-Lock is the world's simplest mechanism for mounting wheels to shafts.) 476 stock sizes in A, B, C and D grooves.

TORQUE-ARM SPEED REDUCERS: America's most complete line of shaft mounted speed reducers. Capacities from 1 to 27 h.p. Output speeds from 12 to 330 r.p.m.

DODGE-TIMKEN BEARINGS: Another Dodge "first." Mounted units, proved in millions of industry's toughest jobs. Four types to choose from. Shaft sizes from 1-3/16" to 8".



ROLLING GRIP FRICTION CLUTCHES: Another Dodge "first." No toggles. Flexible, smooth. Bolted plate and gear tooth plate. 1.3 to 21.2 h.p. at 100 r.p.m.

SLEEVOIL BEARINGS: Another Dodge "first." Precision-built, quiet, dependable — "tops" for fan and blower service. Sizes 1-7/16" to 8" in both plain and water cooled types.

SOLID STEEL CONVEYOR PULLEYS: Maximum strength, minimum weight. *Modern* pulleys with interchangeable hubs that cut installation cost. Diameters 6" to 8". All face widths.

DODGE V-BELTS: Concave sidewall design. High-strength cord section. Factory measured to insure matched drives with Dodge precision-built sheaves —for dependable performance.

DODGE TAKE-UPS: Modern, rugged, dependable. Roller bearing (illustrated), ball bearing and babbitted. Shaft sizes from 3/4" to 4". Travel from 4" to 36".

SPECIALISTS IN POWER TRANSMISSION MACHINERY FOR 73 YEARS

●

NOTED THROUGHOUT THE WORLD FOR HIGH QUALITY, PRECISION MANUFACTURE

●

MANUFACTURERS OF A BROAD LINE OF MECHANICAL POWER TRANSMISSION MACHINERY

●

ORIGINATORS OF NEW AND BETTER PRODUCTS FOR THE MECHANICAL TRANSMISSION OF POWER

●

USED CONFIDENTLY WHERE THE GOING IS TOUGHEST

DODGE MANUFACTURING CORPORATION, 100 Union St., Mishawaka, Ind.

CALL THE TRANSMISSIONEER: Most Dodge products are normally available from distributors' stocks — in your territory — when you need them. For information on the newest and best methods of mechanical power transmission, call the Dodge Transmissioneer, graduate of the Dodge factory course. He is your local Dodge Distributor. Look for his name under "Power Transmission Equipment" in your local classified telephone directory.

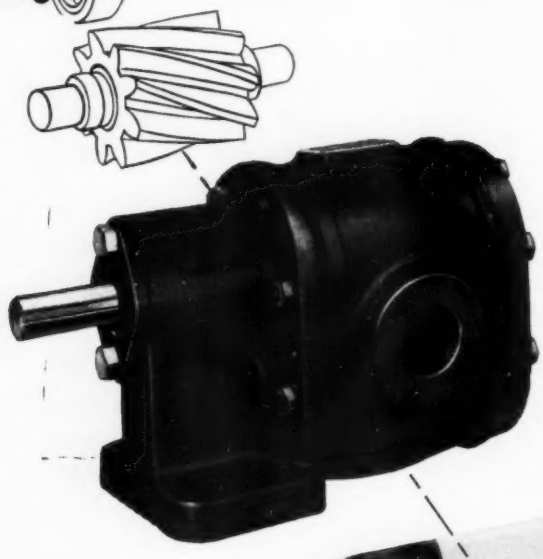
PILLOW BLOCKS: Roller Bearing, Ball Bearing, Babbitted. **FLANGE BEARINGS:** Roller, Ball, Babbitted. **HANGER BEARINGS:** Roller, Ball, Babbitted. **TAKE-UPS:** Roller Bearing, Ball Bearing, Babbitted. **BASE PLATES. FLOOR STANDS. DROP HANGERS. V-BELT SHEAVES:** Both TAPER-LOCK and Bored-to-Shaft-Size. **BELTS:** Industrial and FHP V-Belts and Flex-Link Belting. **SPEED REDUCERS:** TORQUE-ARM Shaft Mounted Speed Reducers. **CLUTCHES, FRICTION:** Rolling Grip, Diamond D and Solid Types. **COUPLINGS:** TAPER-LOCK Flexible, TAPER-LOCK Rigid and Flange Types. **SAFETY SET COLLARS. PULLEYS:** Steel Split Transmission and Solid Steel Conveyor Pulleys. Rubber Lagging. **VISES:** SLIDE-SET Machinist's...FOR COMPLETE LINE, TYPES AND SIZES, WRITE FOR BULLETINS AND 224-PAGE CATALOG.

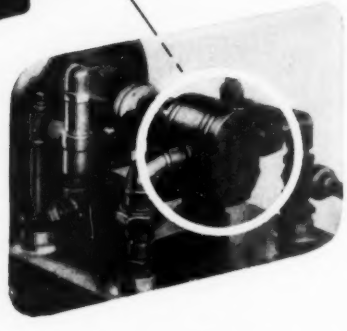
DODGE

of Mishawaka, Ind.

"First in Power Transmission Machinery!"

Smooth-operating quiet hydraulic systems start here





Rotary Geared Pumps with Helical Gears and Roller Bearings

Here's an easy way to add extra features to the design of hydraulically-operated machines . . . a quiet-operating pump that provides smooth continuous flow. By specifying Brown & Sharpe Rotary Geared Pumps with helical gears made to extreme accuracy and operating on roller bearings, you can assure these features. What's more, trouble-free service life of the pump is extended too!

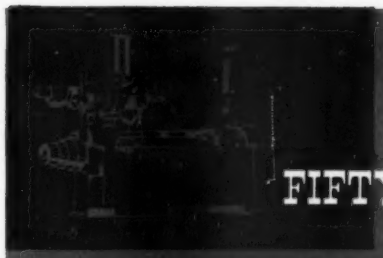
Brown & Sharpe Rotary Geared Pumps with helical gears and roller bearings are made in two sizes: No. 53 — 4 to 23.3 gallons per minute at 0 lbs. pressure; and No. 55 — 9 to 34.1 gallons per minute at 0 lbs. pressure. Although designed for direct drive, these pumps may be driven by pulley or gear. Made to run in one direction only, either clockwise or counterclockwise. Leakage and gland adjustments present no problems because the pumps have a mechanical seal.

Let these pumps help you *advance* your machine design by supplying oil under pressure for hydraulically-operated machines, or for lubrication systems where quietness is essential. Get all the facts. Write for Pump Catalog. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.

GEARED • VANE • CENTRIFUGAL • MOTOR DRIVEN

We urge buying through the Distributor

Brown & Sharpe B·S



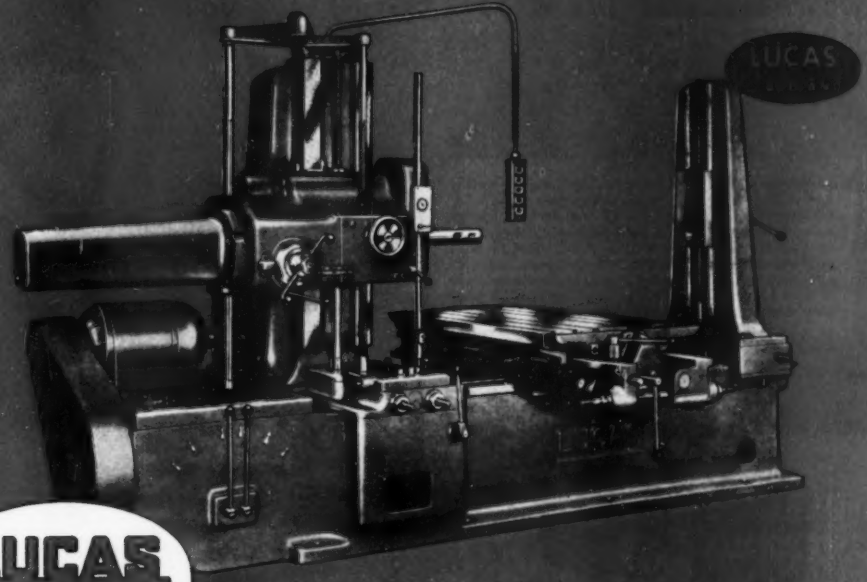
FIFTY-ONE YEARS ONE PRODUCT

and a *Better product* every year

For half a century we have concentrated on one thing . . . improving Lucas horizontal boring machines.

Through all these years the thousands of Lucas "Precision" horizontal boring machines in use throughout the metal-working industries have demonstrated their outstanding leadership as the Standard of Comparison for both extreme accuracy and top performance.

The recent improvements incorporated in the advanced design of today's Lucas machines is a guarantee that this leadership will be maintained.



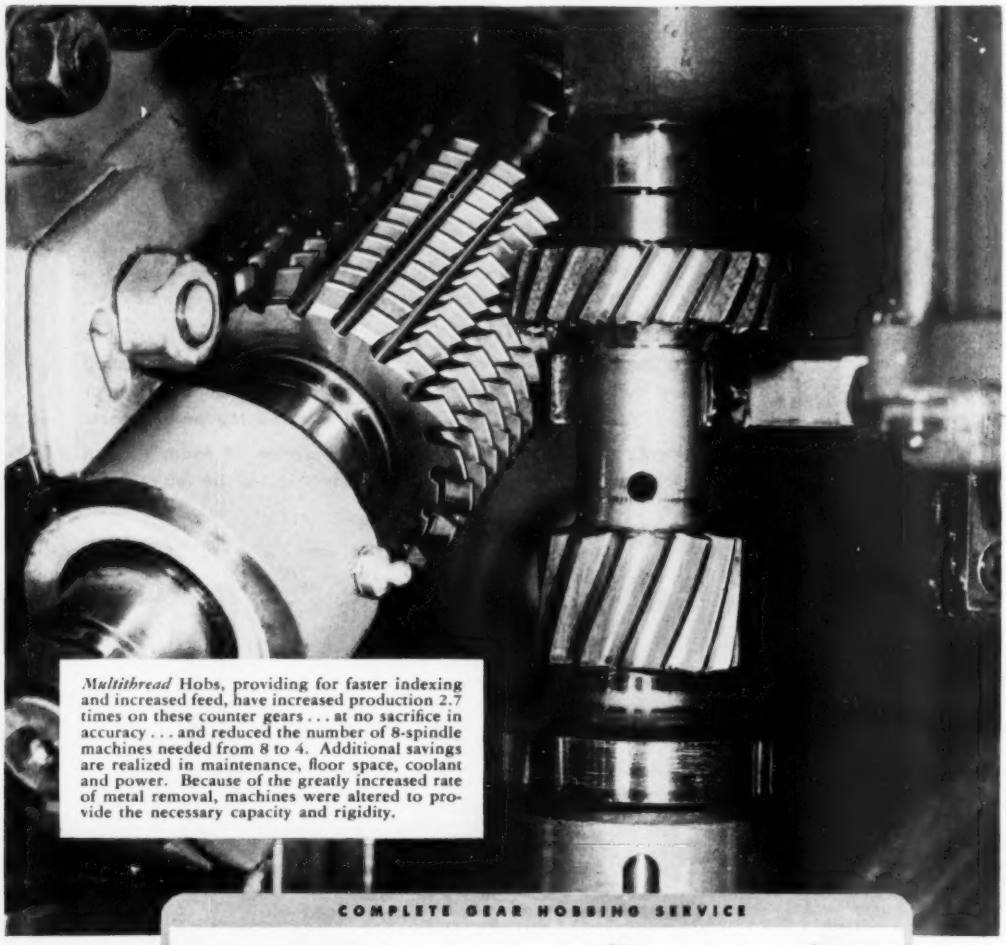
LUCAS *Precision*

HORIZONTAL BORING, DRILLING AND MILLING MACHINES
LUCAS MACHINE DIVISION, THE NEW BRITAIN MACHINE CO.
CLEVELAND 8, OHIO

Barber-Colman

Multithread Hobs

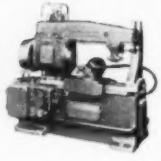
TRIM GEAR CUTTING COSTS



Multithread Hobs, providing for faster indexing and increased feed, have increased production 2.7 times on these counter gears . . . at no sacrifice in accuracy . . . and reduced the number of 8-spindle machines needed from 8 to 4. Additional savings are realized in maintenance, floor space, coolant and power. Because of the greatly increased rate of metal removal, machines were altered to provide the necessary capacity and rigidity.

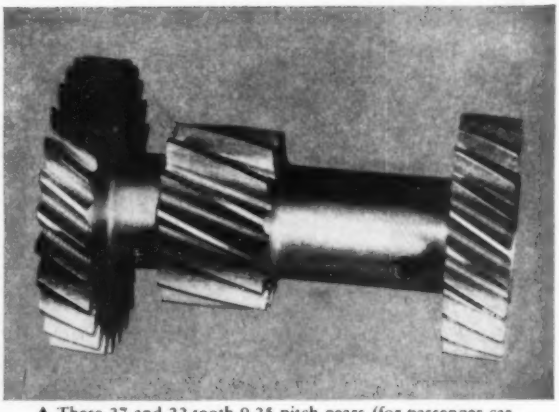
COMPLETE GEAR HOBBING SERVICE

BARBER COLMAN



HOBS • MACHINES • SHARPENING • TECHNICAL DATA

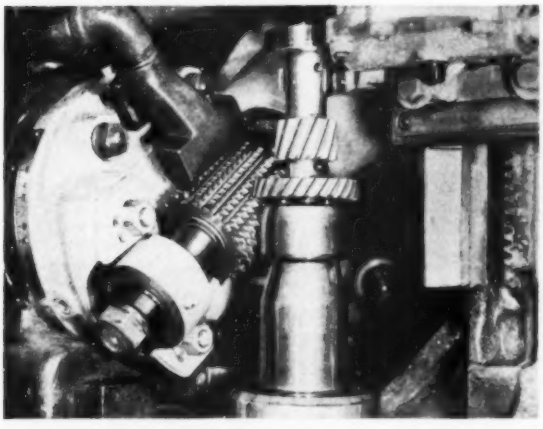
▲ These 4" x 4" *Multithread* hobs have more gashes for finer finish. A taper hole eliminates runout, holding the pitch line of the cut gears to maximum concentricity. Precision spacing of 3 leads produces involute and tooth spacing to preshave limits.



▲ These 27 and 22-tooth 9.25 pitch gears (for passenger car and truck transmissions) are forged from AISI 5145 or 8620-H steel. *Multithread* hobs have cut costs per gear to slightly over 1/3 former average. Lead errors are held within .0005". Production per hour has been increased from 26 to 82 gears (net, at 85% efficiency).

Automotive Plant Pioneers New Hob Application with Barber-Colman Hob Engineers. Disregards Conventional Hob Design to Almost Triple Production. Cuts Costs to ⅓ Previous Average.

▼ The 27-tooth gear on the counter gear is hobbed at 156 rpm and .062" feed. Previous feed was .053". Face width is 5/8". Cutting time per gear has been reduced from 6.55 to 2.2 minutes. Remarkable savings are possible because of increased feed and faster indexing with *Multithreads*.



The 22-tooth gear on the counter gear is hobbed at 156 rpm and .052" feed. Cutting time is 2.16 minutes. Single-thread ground hobs formerly cut at .043" feed. Hobbing time averaged 6.13 ◀ minutes per gear.

Multithread Hobs are a development by Barber-Colman engineers, providing faster indexing in the hobbing of gears. Instead of the usual single lead, *Multithreads* have several threads, and have produced unusual production increases on gear cutting jobs requiring very high rates of output.

As a result of production gains possible with hobs of this design, a fewer number of hobbing machines are required to complement the finish shaving and grinding equipment.

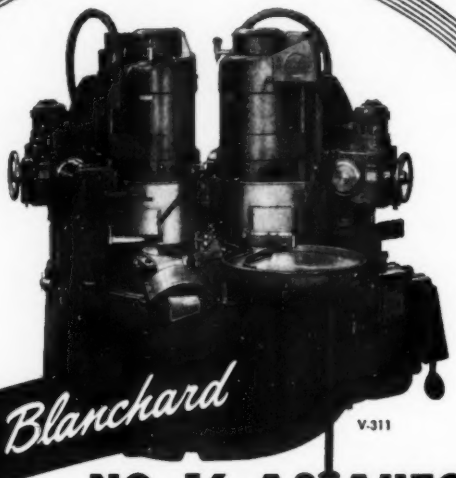
Multithreads are recommended only on the basis of comprehensive analysis of the job factors in individual plants. Therefore, we suggest that you ask a Barber-Colman Representative to call.

Write for additional information about the production increases possible with *Multithread* Hobs.

Barber-Colman Company

GENERAL OFFICES AND PLANT, 312 ROCK STREET, ROCKFORD, ILLINOIS, U.S.A.

BUILDERS OF PRECISION GEAR HOBS AND MACHINES SINCE 1911



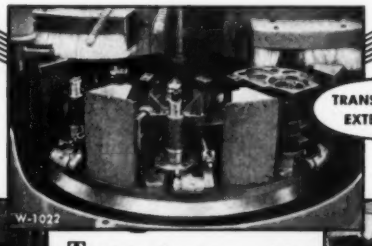
V-311

Put them on a Blanchard

NO. 16-A2 AUTOMATIC

This two-spindle surface grinder is a real producer. In a single pass, the work is roughed by one wheel and then finished by the second wheel. Because each wheel can be selected for its part of the grinding operation, without having to compromise between roughing and finishing, the No. 16-A2 is particularly suited to work requiring high production. Close limits are assured by automatic size control for each wheel. If you're looking for maximum results with minimum effort, get production details on just how fast your own work can be done on the No. 16-A2.

Send blueprints or samples — there is no charge or obligation.



W-1022

TRANSMISSION EXTENSION

PINION CARRIER BEARING CAPS

W-1020

The joint face is ground by loading the cast iron part over a post, locating from a shoulder, supporting the flange by a spring bunter. It is clamped automatically. Parts are held flat to .001", square with bore to .002", and to ±.001" for size. 84 pieces ground per hour on one side.

REAR AXLE PINION CARRIER

W-1024

These cast iron caps are placed in suitable stations, automatically clamped, ground, and automatically unclamped. 1020 caps per hour are ground to ±.003", and flat to .002" in a 20 station fixture. 1/16" of stock is removed per side.

Send for your free copies of "Work Done on the Blanchard," third edition, and "Art of Blanchard Surface Grinding."

These cast iron parts are loaded with the flange under a "U" shaped block, clamped upward against the block. The four bearing surface "feet" are ground to limits of ±.003", parallel to flange within .001". 229 pieces are ground per hour on one side.

PUT IT ON THE BLANCHARD

THE BLANCHARD MACHINE COMPANY **64 STATE ST., CAMBRIDGE 39, MASS., U.S.A.**

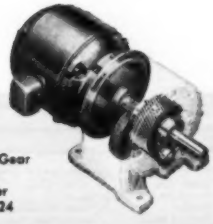
No one speed reducer solves every reduction problem

That's why LINK-BELT builds all 3

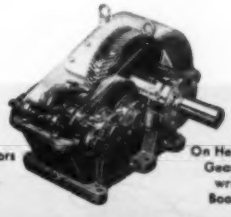
WHETHER it's a gearmotor, a herringbone or worm gear drive that best fits your needs—you get an unbiased recommendation, an incomparable product from your Link-Belt power transmission engineer.

That's why Link-Belt builds all three; has no axe to grind. You can be sure you get the one that suits all your requirements for ratio, space, shaft position, shock loading and many other factors. Precision-engineered for quiet, economical power transmission, all Link-Belt drives will give you long service under the toughest operating conditions.

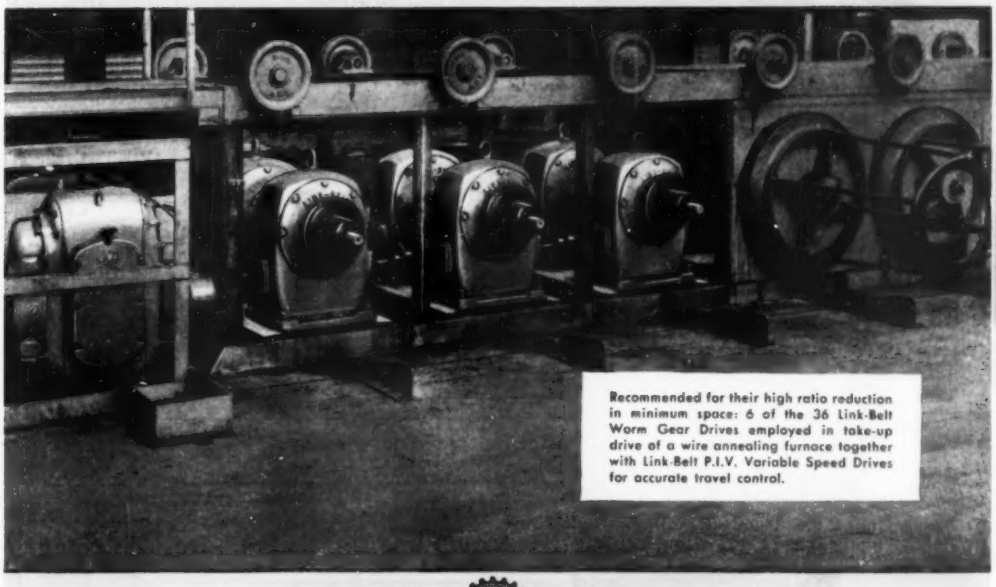
On Worm Gear Drives write for Book 2324



On Gearmotors write for Book 2247



On Herringbone Gear Drives write for Book 2419



Recommended for their high ratio reduction in minimum space: 6 of the 36 Link-Belt Worm Gear Drives employed in take-up drive of a wire annealing furnace together with Link-Belt P.I.V. Variable Speed Drives for accurate travel control.

LINK-BELT ENCLOSED GEAR DRIVES

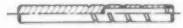
12,330

LINK-BELT COMPANY Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Johannesburg. Offices, Factory Branch Stores and Distributors in Principal Cities.

Get cost savings like

MACHINE TEST REPORT

Stock Size - 7/16" Round
Part Name - Spindle Sleeve
Machine - Davenport Model B
Cutting Media - Sulphurized Oil
Machine Operations - Face, Center Drill, Chamfer, Step Ream, Cut Oil Groove, Recess, Cut-Off.



COMPARATIVE PRODUCTION

Grade	RPM	SFM	Part Time (Seconds)	Gross Parts Per Hour	Production Increase (Percent)	Tool Life Increase (Percent)
B-1113	1950	221	14.5	250	36.1	36.1
MX	2500	286	10.5	343		

***ESTIMATE OF COMPARATIVE COSTS**

	B-1113	MX
Net Production/Hr. at 70 Percent Efficiency	176	240
Hours to make 10,000 parts	56.8	41.7
Direct Labor (one operator to two machines) @ $1.00 Mach./Hr.	$56.80	$41.70
Machine Overhead @ $4.00 per Mach./Hr.	$227.20	$166.80
Conversion Cost	$284.00	$208.50
Material Cost	$104.54	$106.90
Total Manufactured Cost of 10,000 Parts	$388.54	$315.40
Saving	$73.14 = 18.8 Percent	

*Note - These cost figures are not those of the manufacturer, but have been calculated on the basis of assigned rates for Direct Labor and Machine Overhead and Machine Efficiency.

MACHINE TEST REPORT

Stock Size - 11/32" Round
Part Name - Screw
Machine - Brown & Sharpe #00
Cutting Media - Sulphurized Oil
Machine Operations - Drill, Rough and Finish Form, Thread, Cut-Off

COMPARATIVE PRODUCTION

Grade	RPM	SFM	Part Time (Seconds)	Gross Parts Per Hour	Production Increase (Percent)	Tool Life Increase (Percent)
B-1113	2060	202	19.33	186	29	29
MX	2900	260	15	240		

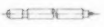
***ESTIMATE OF PRODUCTION COSTS**

	B-1113	MX
Net Production/Hr. at 75 Percent Efficiency	140	180
Hours to make 10,000 parts	71.4	55.5
Direct Labor (one operator to two machines) @ $.85 Mach./Hr.	$ 60.69	$ 47.17
Machine Overhead @ $2.50 per Mach./Hr.	$178.50	$138.75
Conversion Cost	$239.19	$185.92
Material Cost	$ 17.66	$ 18.03
Total Manufactured Cost of 10,000 Parts	$256.85	$203.95
Saving	$52.90 = 20.6 Percent	

*Note - These cost figures are not those of the manufacturer, but have been calculated on the basis of assumed rates for Direct Labor and Machine Overhead and Machine Efficiency.

MACHINE TEST REPORT

Stock Size - 1/4" Round
Part Name - Shaft
Machine - Brown & Sharpe #00
Cutting Media - General Purpose (Not Sulphurized)
Machine Operations - Form (five diameters) Cut-Off



COMPARATIVE PRODUCTION

Grade	RPM	SFM	Part Time (Seconds)	Gross Parts Per Hour	Production Increase (Percent)	Tool Life Increase (Percent)
B-1113	3890	255	7.0	514		
MX	4240	277	4.5	800	55.6	55.6

***ESTIMATE OF COMPARATIVE COSTS**

	B-1113	MX
Net Production/Hr. at 80 Percent Efficiency	411	640
Hours to make 10,000 parts	24.33	15.62
Direct Labor (one operator to three machines) @ $.65 Mach./Hr.	$15.81	$10.16
Machine Overhead @ $1.95 Mach./Hr.	$47.44	$30.48
Conversion Cost	$63.25	$40.64
Material Cost	$34.41	$36.11 *
Total Manufactured Cost of 10,000 Parts	$97.66	$75.75
Saving	$21.91 = 22.4 Percent	

*Note - These cost figures are not those of the manufacturer, but have been calculated on the basis of assumed rates for Direct Labor and Machine Overhead and Machine Efficiency.

these on your screw machine parts ...do the job with MX

the new free-machining Bessemer screw stock!

Would you spend $2.34 extra for MX to save $73.14 on the manufactured cost of 10,000 parts? Do you think a saving of $21.71 justifies spending 70 cents more for MX? Would you pay 37 cents more for MX to save $52.90?

We think you would.

Savings like these are typical of the results obtained when MX is used in place of ordinary Bessemer screw stock. Enthusiastic reports from screw machine operators emphasize the fact that whenever fast-cutting MX is put to work, production goes up and costs go down ... anywhere from 6% to 22%. In fact, you can safely figure that MX will cut the cost of *any* part you now machine from ordinary Bessemer screw stock. And the more the machine work required, the greater the savings will be. That's why, despite its slightly higher cost, MX is proving itself the most *economical* bar stock developed to date.

U·S·S Free-Machining MX cuts costs in four ways. By increasing the rate of production, *it lowers the cost per part.* By prolonging tool life *it reduces down-time.* By assuring better part finish it often *eliminates extra finishing operations.* By providing closer dimensional accuracy, *rejections are minimized.*

If you haven't yet tried MX on a production basis, do it soon.

U·S·S Free-Machining MX is being produced in all the popular bar sections and sizes. You can obtain it in cold finished form from your regular supplier as "MX" or under his own identifying trade name. In hot rolled form MX is available direct through our nearest district sales office.

● *For more parts and better parts—at lower cost per part*—standardize on MX.

USE THIS COUPON

United States Steel Company
Room 4239 Carnegie Building, Pittsburgh 30, Pa.

Please send me a copy of the MX bulletin

Name.....

Address.....

Company.....

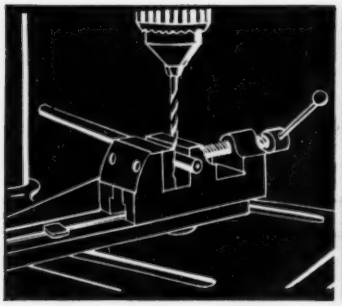
City.....Zone.....State.....

USS

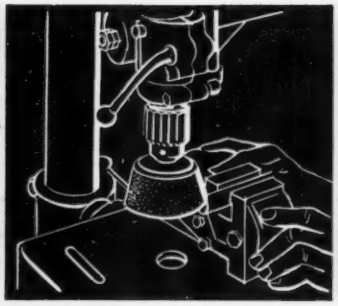
AMERICAN STEEL & WIRE COMPANY, CLEVELAND · COLUMBIA STEEL COMPANY, SAN FRANCISCO
TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM · UNITED STATES STEEL COMPANY, PITTSBURGH
UNITED STATES STEEL SUPPLY COMPANY, WAREHOUSE DISTRIBUTORS, COAST-TO-COAST
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

1-336

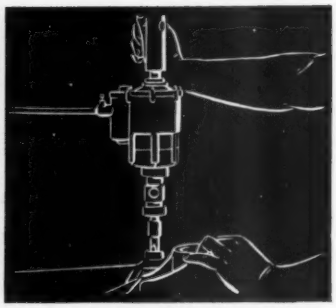
UNITED STATES STEEL



For drilling— capacity to ½" drills. A wide range of speeds and dependable accuracy make this an ideal machine for all shops.

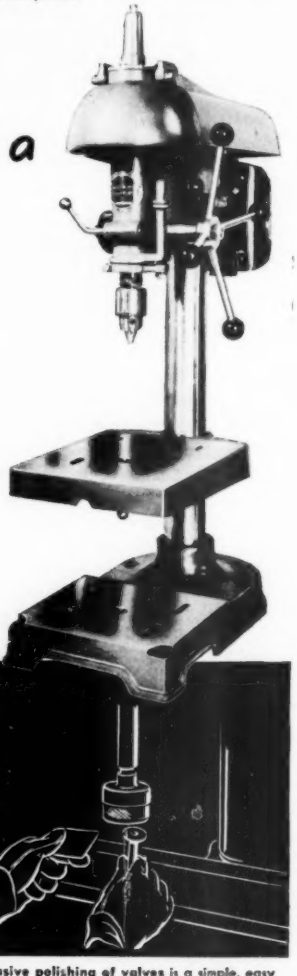


For surface grinding— a flare cup or recessed wheel equips the drill press to handle many different surface grinding operations.



Precision, high-speed tapping is done by simply installing a tapping attachment on the machine spindle.

DRILLING is only one of many jobs you can do with a WALKER-TURNER DRILL PRESS

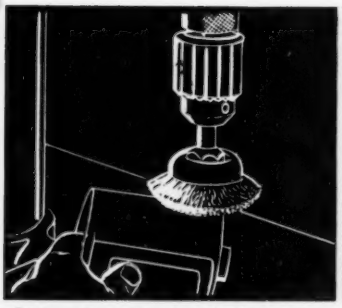


When you use Walker-Turner machines you profit not only from their great versatility, but from the operating efficiency and long service life of these modern power tools.

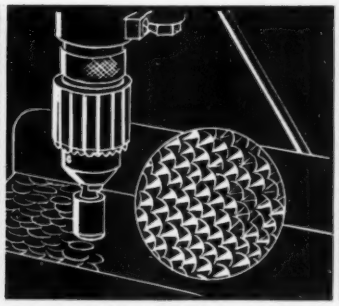
WALKER-TURNER

KEARNEY AND TRECKER CORPORATION
PLAINFIELD, N. J.

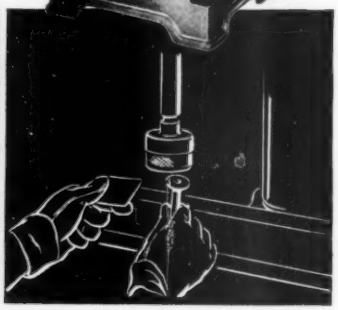
SOLD ONLY THROUGH AUTHORIZED DEALERS



For removing rust, scale and paint— with a wire end brush attached to the spindle, the easily controlled pressure of the drill press readily removes hard incrustations such as these.



For spot polishing and finishing— bare metal surfaces (of machines) can be given a new "precision" finish by using an improvised polishing tool and running drill press at slow speed.



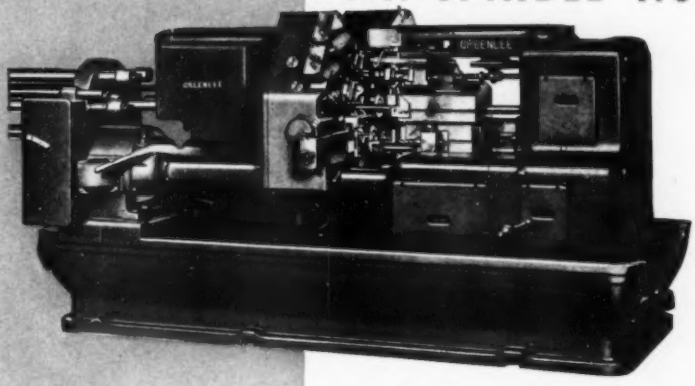
Abrasive polishing of valves is a simple, easy operation with a Walker-Turner Drill Press and the special set-up shown above. Abrasive cloth, backed by rubber, does the polishing.

DRILL PRESSES • RADIAL DRILLS • TILTING ARBOR SAWS • BELT and DISC SURFACERS
METAL-CUTTING BAND SAWS • METAL-SPINNING LATHES • SPINDLE SHAPERS • JOINTERS

RUGGED, COMPACT, EFFICIENT

GREENLEE

SIX-SPINDLE AUTOMATICS



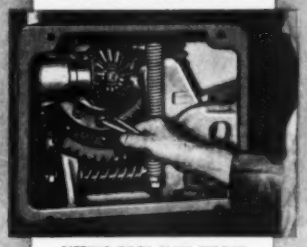
CUT COSTS *on all kinds of* JOB SHOP WORK

GREENLEE Automatic Screw Machines are rugged, compact, surprisingly simple in operation and maintenance, and unusually versatile. *Check these time-saving and cost-cutting features.*

CHANGING A CROSS SLIDE CAM

INTERCHANGEABLE CROSS SLIDE CAMMING

All six cross slide cams can be replaced in less than 6 minutes, and only 15 cams handle 90% of the average job-shop requirements.



SETTING TOOL SLIDE STROKE

STANDARDIZED TOOLING SPEEDS SET-UPS

With identically machined tool cavities and interchangeable tool holders, Greenlee Automatics make quick job changes a cinch. You save in equipment costs, too!

A SIMPLE ADJUSTMENT SETS THE STROKE

A graduated worm wheel permits an accurate setting of the tool slide stroke in a simple, easy operation without guesswork, fuss, or bother.

A ROOMY TOOLING AREA HELPS OPERATORS

There's plenty of elbow room in the tooling area, making it easy for operators to accurately position tools and attachments for best results.

WRITE TODAY... and let us send you our 20-page book on Greenlee Automatics. Ask for Screw Machine literature.

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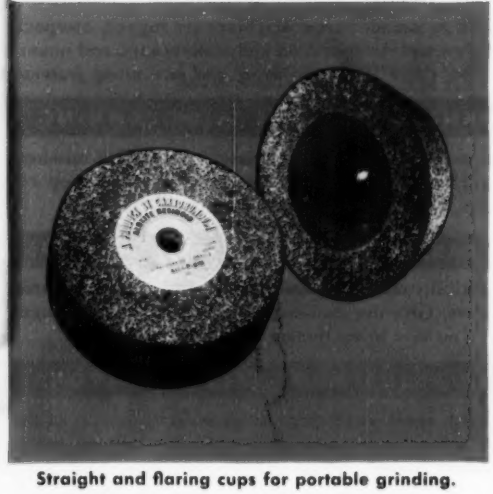
DRILLING, BORING, TAPPING MACHINES • SCREW MACHINES • TRANSFER PROCESSING MACHINES

MAINTAIN PRODUCTIVITY

Rubber washers furnished for rubber bushed wheels.

A variety of Cones and Plugs.



Straight and flaring cups for portable grinding.

Mounted points for every portable grinding application

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AT HIGH LEVELS

with Portable Grinding Wheels by

CARBORUNDUM
TRADE MARK

CARBORUNDUM's *complete* line of bonded products for general purpose and weld grinding enables metalworking plants to maintain a high rate of production at lowest cost with the *right* abrasive for each and every grinding operation.

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Your CARBORUNDUM representative will be glad to give you full details about portable grinding wheels, plugs, cones and mounted points by CARBORUNDUM —and impartially recommend any other abrasives you may need, from the *complete* CARBORUNDUM line.

RUNDUM

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makes ALL Abrasive Products...to give you the proper ONE

1 MICRO-INCH FINISH
is diamond lapped and imparts a bright, lustrous surface to parts drawn.
750,000 p.s.i. COMPRESSIVE STRENGTH
deep draws the toughest alloys with ease—without pickup, scoring or scratching.
95,000,000 p.s.i. MODULUS OF ELASTICITY
(3 times steel) holds size and tolerance to .0001"—cuts rejects and scrap.
SPECIAL MOUNTING PROCESS
is accurately calculated to withstand drawing pressures—and increases both the transverse and longitudinal strength of the nib.
79 ROCKWELL "C" HARDNESS
(hardest steel—68 "C") of talide nib assures continuous 24-hour production without downtime or maintenance costs.
up to 24" in diameter
ALLOY STEEL CASE
of maximum hardness, strength and toughness gives adequate support and backing to the carbide nib.

an easy way to *Triple Production* on a machine or press

• On the same presses and machines now in your production line, Talide Carbide Dies can make a big $ and ¢ difference. *Here's why.* Each Talide Die will outwear a steel die by at least 20 times and, in most applications, will last 50 times longer. Think of the cost advantages of those long runs and all the advantages of infrequent "down time" for redressing. Do as others do, *triple* your production with Talide Metal.

Made of the hardest metal known, each Talide Die has the same great strength, phenomenal resistance to wear and consistent uniformity. Talide Carbide never varies in quality.

Talide Carbide Dies are available for blanking, drawing, swaging, extruding, spinning or curling. For other operations, buy Talide bar stock, blades, cutting tools, drill jig bushings, work rolls or diamond products.

Try Talide Metal and triple your production with present equipment. Write us or nearest sales office.

Send for Catalog 50-G.

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METAL CARBIDES CORPORATION
TALIDE
YOUNGSTOWN, OHIO
HOT PRESSED CARBIDES

METAL CARBIDES CORPORATION

YOUNGSTOWN 7, OHIO *Pioneers in Tungsten Carbide Metallurgy*

CUTTING TOOLS · DRAWING DIES · WEAR RESISTANT PARTS

8 STANDARD SIZES...

in the NEW LAPOINTE "H-P" SERIES Horizontal Broaching Machines

Designed with longer strokes (30-inch to 78-inch), the "H-P" Series offers a wide range of sizes all the way from 2½ Ton to 50 Ton capacity.

This rugged, powerful LAPOINTE Horizontal Broaching Machine embodies a **hydraulic system** that assures smooth operation under varying load and speed conditions. It is amazingly versatile . . . it will handle any type of internal broaching and many types of surface broaching.

We earnestly suggest that you **write today** for the new "H-P" Bulletin containing engineering data and complete specifications.

JUST ASK FOR BULLETIN HP-2

Electrolized **BROACHES**

Lapointe Broaching Tools can be treated by our exclusive Electrolizing process, for longer life. If you are not acquainted with this process, ask us for information.

can take FULL RESPONSIBILITY for all your broaching requirements:

MACHINES, FIXTURES, AND TOOLS!

We don't take you part way — we engineer the complete job, *all the way through.* This eliminates divided responsibility . . . it guarantees *successful results.*

THE *Lapointe* MACHINE TOOL COMPANY

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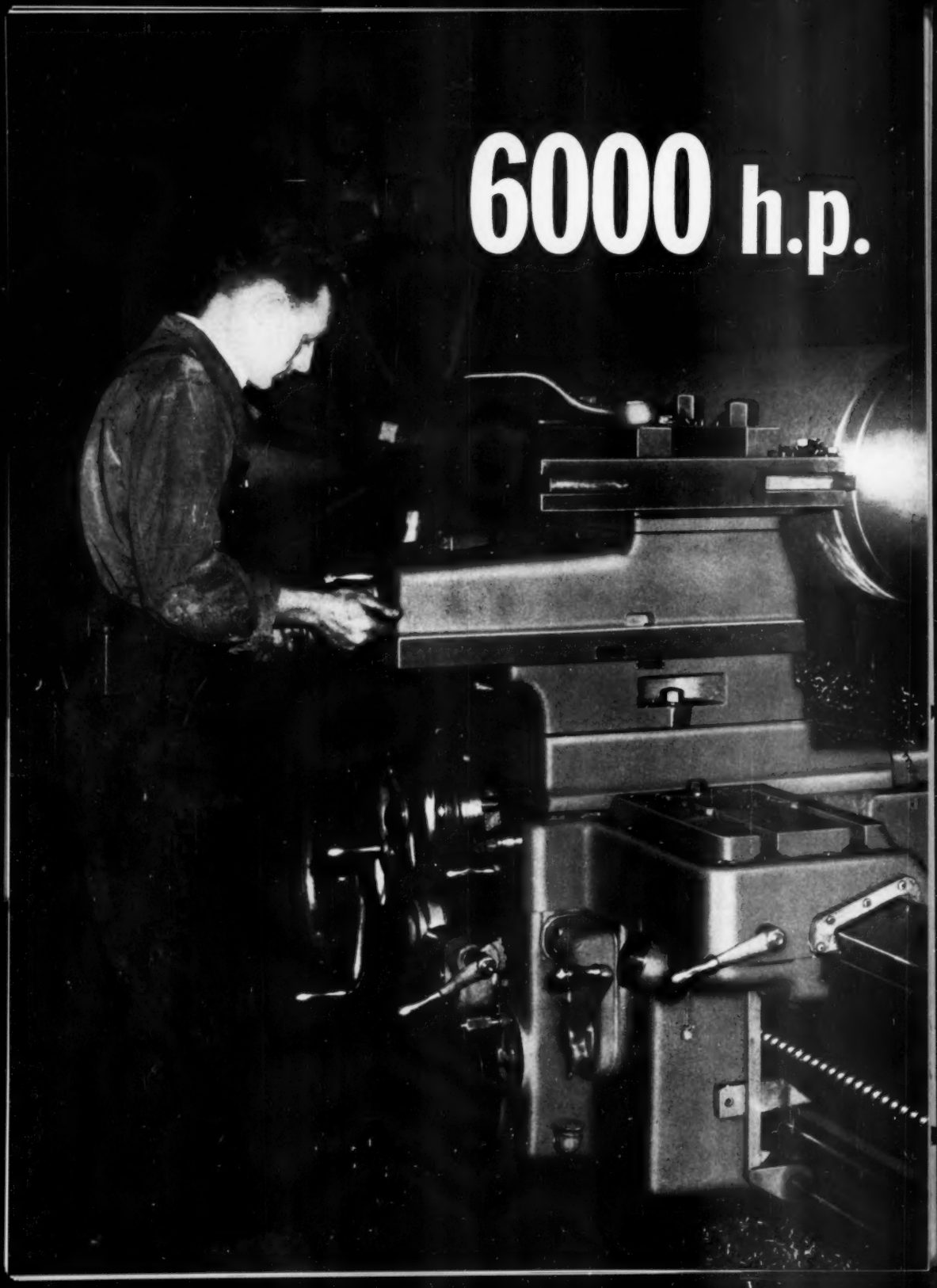
Branch Factory • Edgware • Middlesex • England

THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHES AND BROACHING MACHINES


6000 h.p.

will go through this shaft!

This tailshaft turns the screw in a C-2 Cargo Vessel. It's made to take the relentless pounding of a 6000 h.p. power plant for weeks without letup.

To machine it accurately and economically, Moore Dry Dock Co. of Oakland, California needed a powerful precision lathe. That's why they gave the job to a new LeBlond 50" Heavy Duty Lathe . . . recommended by LeBlond Distributor, Bulotti Machinery Co. of San Francisco. Result? *17 hours off former machining time with a cost saving of 18%.*

This LeBlond Lathe provides fifty horsepower; spindle speeds up to 247 r.p.m.; rigid construction. It makes possible latest turning techniques with carbide tools; gives better finish, closer tolerances and greater economy.

Operators' work is easier, too, because of convenient features—single-lever feed control, exclusive *power rapid traverse* and many more.

Whether you turn ten-ton shafts or ten-ounce bushings, there's a LeBlond Lathe to turn them faster, better. Your nearby LeBlond Distributor will tell you about the 50" Heavy Duty and other late model lathes. Call him or write—

THE R. K. LEBLOND MACHINE TOOL CO., CINCINNATI 8, OHIO

Ask for Bulletin HD-180 A
for more information on the 50" Heavy Duty.

turned faster by

LeBLOND
of Cincinnati

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ARMSTRONG
TOOL HOLDERS...
for every operation!

There are **ARMSTRONG** Tool Holders in sizes and types for every operation on lathes, planers, slotters and shapers —for the heaviest cuts; for the most delicate cuts.

With Standard shaped cutters, bits and blades of **ARMSTRONG HIGH SPEED, ARMALOY** (Cast Alloy) and **ARMIDE** (Carbide-Tipped) they provide a system of tooling that assures maximum production per machine hour, lower tool costs, and higher machining profits.

These permanent multi-purpose tools can be picked up as needed from your industrial distributor. Use them wherever possible to increase number of pieces per hour, to lower cost per pieces.

Write for Catalog.

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"The Tool Holder People"

5215 W. Armstrong Ave. Chicago 30, Ill.

NOW READY FOR YOU —

New YALE Fluid-Drive GAS TRUCKS

Developed to peak efficiency in two years of intensive on-the-job testing

Here's proof that YALE gives more for your money!

Only YALE gives you fluid-drive for smooth, powerful operation—longer truck life:

Now you can get the same efficient power transmission used in expensive passenger cars. Smooth, *full* power at any speed—even fully loaded on ramps! No jerky stops and starts—you can work in closer quarters, cut down load breakage, reduce driver fatigue, save tires, *lengthen clutch life 3 to 6 times!*

Only YALE gives you this extra-power combination—hypoid gearing—65HP engine:

Here is a newly developed power team that can handle capacity loads, steep grades, heavy road shock day after day in any weather—and still stay on the job with an absolute minimum of "down time" for maintenance!

Only YALE gives you all these exclusive money-saving features:

Sealed automotive type hydraulic brakes give greater safety. Shockless steering provides easy "passenger car" control. Cold drawn, precision aligned uprights assure smooth, even lifting. *Every* vital part, in fact, has been designed and developed to give you *more truck for your money.*

Now, get your own on-the-job proof:

Now, when manpower, time and production are at a premium, is the time to see for yourself how much more this YALE gas fork truck can do for you. Write for all the facts today.

Capacities up to 10,000 pounds

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MATERIALS HANDLING DIVISION

Sweet's File for the Mechanical Industries

looking

1 machine tools and other production equipment

machine tools	a
cutting tools	d
portable and hand tools	e
gages	f
pressing and forming	g
welding and brazing	h
marking	i
finishing	J

2 mechanical equipment

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power transmission	b
pumps and compressors	c
pipe and fittings	d
valves and traps	e
instruments and controls	g
lubrication	h
miscellaneous equipment and supplies	i

3 electrical equipment

motors and generators	a
controls	b

4 materials

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glass	d
thermal insulation	e
refractories	f
vibration isolation	g
roofing and siding	h
waterproofing and dampproofing	i
flooring and wall covering	J
paints and finishes	k

5 structural equipment

structural systems	a
doors and hardware	b
skylights and ventilators	c
partitions, fences and guards	d

6 plant utilities

power generation	a
water conditioning	b
air conditioning and refrigeration	c
lighting	d

7 service equipment, special services

service equipment	a
special services	b

for machine tools?

reach for Sweet's

All these manufacturers' catalogs—containing comprehensive information on machine tools, attachments, and accessories—are instantly available in Section No. 1 of your Sweet's File for the Mechanical Industries.

The other sections of this Sweet's File contain additional catalogs covering a wide range of materials and equipment . . . useful and up-to-date information on product forms, characteristics, performance and use.

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STANDARD EQUIPMENT...

...everywhere

Measuring the pitch diameter of a 1"-8 National Form thread gage. This method is recommended by the Bureau of Standards.

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NEW CONCEPTIONS
NEW FORMULAS
NEW TABLES

for the exact measurement of multiple worms and screws of unknown profile.

The Fundamental Fact

The axis of a wire resting in a thread assumes a position tangent to the helix passed through the center of the wire and not the point of contact.

Van Keuren Measuring Wires are the accepted standard equipment for making pitch diameter measurements of taps, thread gages, precision threaded parts, hobs, worms, splines and gears. Reputable manufacturers of ground taps and thread gages used for the production and acceptance of threaded holes and nuts use Van Keuren Measuring Wires. You will seldom find them in error if you, too, have Van Keuren Measuring Wires.

This 208 page volume represents 2 years of research sponsored by the Van Keuren Co.

It presents for the first time in history a simple and exact method of measuring screws and worms with wires.

It tells how to measure gears, splines and involute serrations. It is an accepted reference book for measuring problems and methods.

Copies free upon request.

Set No. 20 Thread Measuring Wires is a plant necessity for maintaining taps and thread gages within their limits for wear and for proving the pitch diameter of screws and threaded parts.

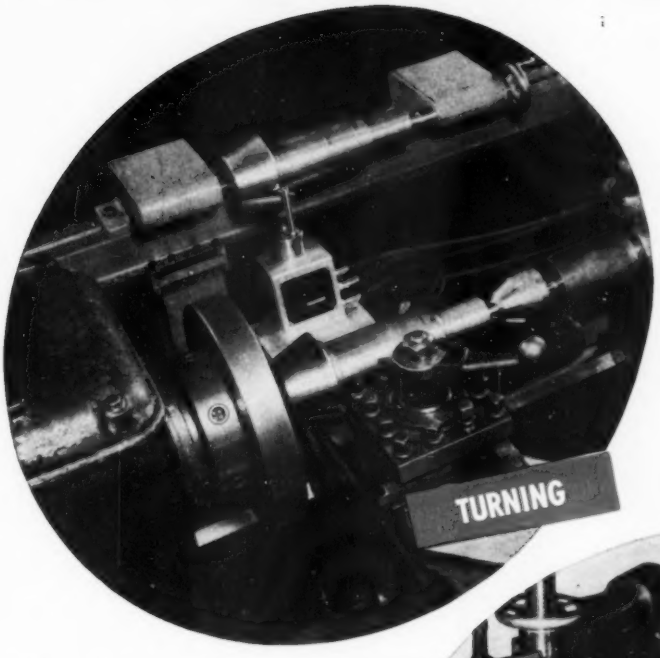
Price, High Speed Steel Wires ..... $ 95.00
Price, Carboloy Wires 240.00

Special wires from .002" to 2.000" diameter are made to any tolerance required.

THE Van Keuren CO., 173 WALTHAM STREET, WATERTOWN, MASS.

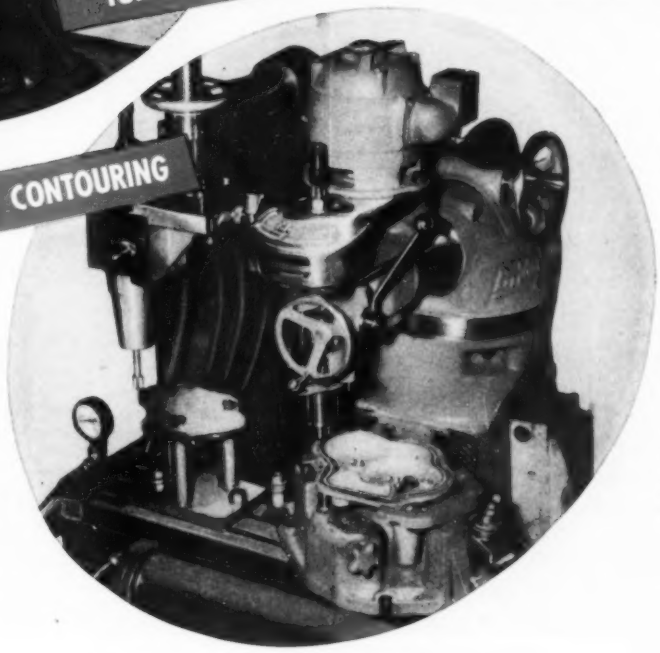
32nd YEAR

Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles • Carboloy Plug Gages • Carboloy Measuring Wires



INCREASE PRODUCTION and CUT COSTS with TURCHAN FOLLOWERS

In the current rearmament program, Turchan hydraulic duplicating attachments for standard machine tools have become increasingly important! Whether for tool room or production work you can produce more jobs, of greater variety, faster, at accuracies beyond human capacity with Turchan equipped machines. The need for costly form tools and specially trained help is eliminated. Setup time is reduced to a fraction of former methods. Jobs from smallest bottle moulds to giant auto body dies can be handled with equal facility. Two examples pictured: *Above*, a stepped shaft being turned by Turchan tracer control, 2 1/2 times faster than former method, using original work piece as the model. *Right*, an intricate gear box part is contoured in about 1/5th time of conventional way. Whatever the job, large or small, simple or tricky—milling, shaping, planing or grinding—**"Turn to Turchan to increase production and cut costs."**

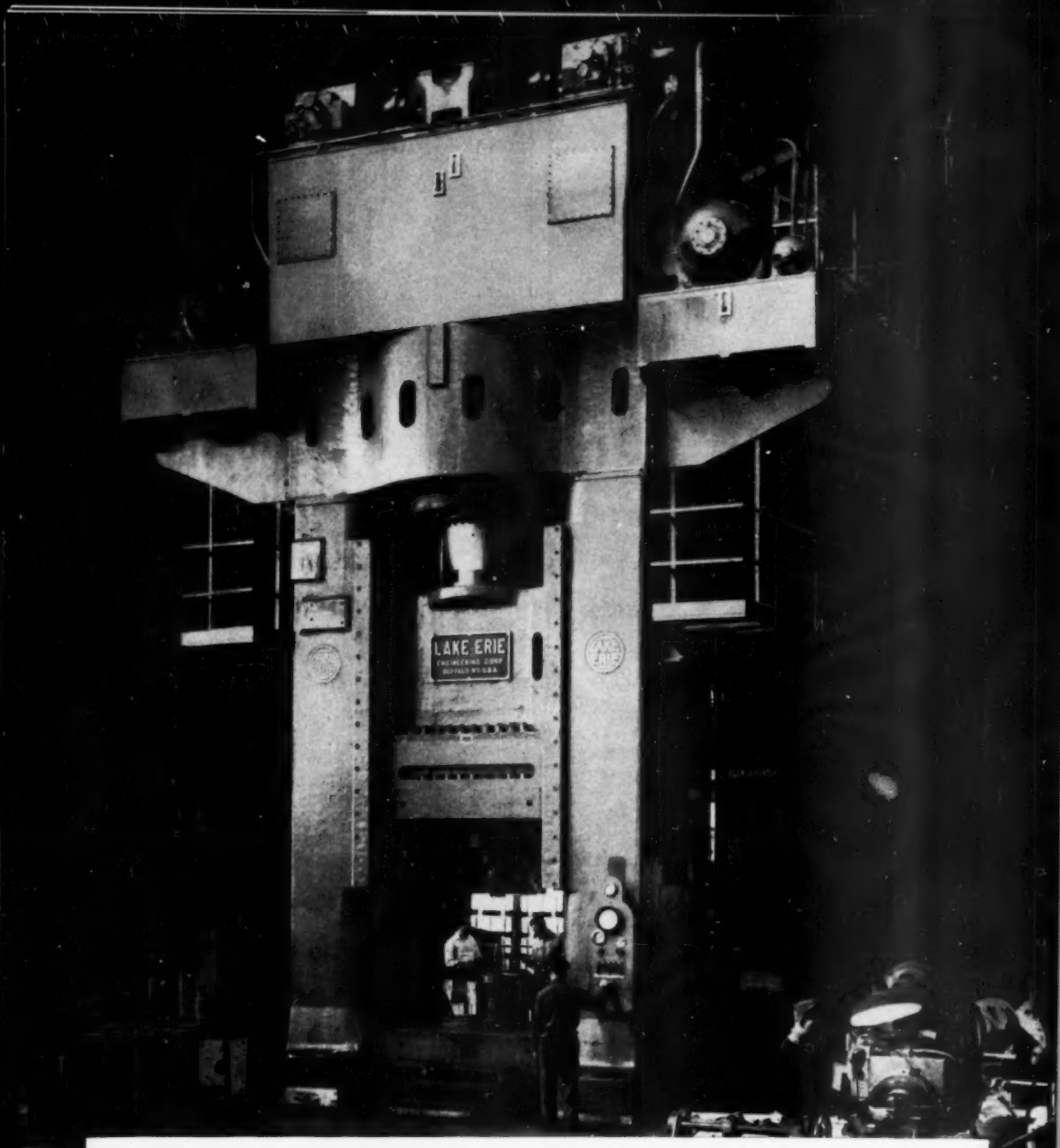


Get ALL the Facts — Write for Catalog!

Also send us a sketch and specifications of any job you are planning. Give make and model number of machine. We'll show you how to produce it better, faster, at lower cost.

Turchan FOLLOWER MACHINE COMPANY 8289 Livernois Avenue DETROIT 4, MICH.

Oldest Manufacturer of Hydraulic Duplicating Attachments for Machine Tools



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● Developed by Lake Erie Engineering Corporation in collaboration with Mullins Manufacturing Corporation of Salem, Ohio.

Press has a bed area 72" x 60", 108" daylight opening and 60" stroke. It stands 35' 39" above the floor and extends 21' below the floor, where a 250 ton hydraulic ejector is located in the bed of the press. The press weighs over 700,000 pounds and is complete with a high-speed self-contained pumping unit, powered by 900 HP motors. Many of these specifications are in excess of those required for production equipment and are incorporated in the press to provide flexibility for experimental and research work.

COLD EXTRUSION OF STEEL...

creates new opportunity for industry

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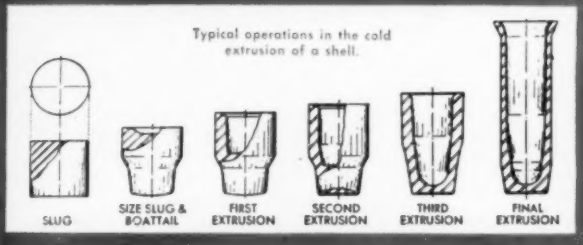
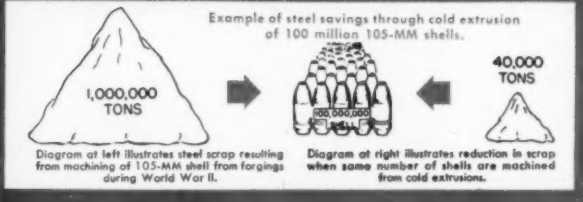
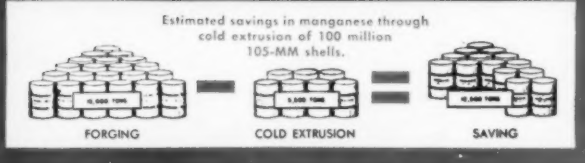
Tremendous savings in metal and machining plus superior characteristics of end products made possible by new developments.




Example of steel savings through cold extrusion of 100 million 105-MM shells.
1,000,000 TONS
40,000 TONS
Diagram at left illustrates steel scrap resulting from machining of 105-MM shell from forgings during World War II.
Diagram at right illustrates reduction in scrap when same number of shells are machined from cold extrusions.



Above diagrams reprinted through the courtesy of General Merie H. Davis and Ordnance Magazine.

IF YOU MANUFACTURE A PRODUCT...

—that resembles a rather thick-walled steel cup or hollow cylinder

—and that calls for fairly high physicals in the final end product

—it will pay you to investigate the remarkable economies made possible by cold extrusion. Besides the unbelievable savings in metal and machining, there are additional benefits such as:

1 Better physical properties through cold working.
2 Superior surface finish.
3 Closer dimensional tolerances.
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5 Less variation in weight.
6 Elimination of heat treatment.
7 Reduction of inclusions, porosity and stringers.

If you manufacture a steel product of a type suitable for cold extrusion, write us. We will assist you without obligation in determining the economies and advantages of the process for your product.

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MANUFACTURERS OF
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LEADING MANUFACTURERS OF HORIZONTAL AND VERTICAL HYDRAULIC EXTRUSION PRESSES FOR STEEL...BRASS... COPPER...ALUMINUM...LEAD PIPE...SOLDER...LEAD ENCASING...SPECIAL ALLOYS...CARBON...AND OTHER MATERIALS

Backstand Method Saves Time!

Toledo Steel Tube Co. saves 2 hours per operation per day in finishing department

The Toledo Steel Tube Co. uses the backstand belt method to remove burrs and grip marks from the tubing. This company points out the following advantages of the backstand belt method over the set-up wheel method:

1 Time is not lost in making set-up wheels. Formerly the operators were given 2 hours a day for making their set-up wheels.

2 One backstand belt will outlast 4 to 5 set-up wheels for this application.

3 Belts maintain a flat surface for the grinding and polishing operation, whereas set-up wheels became rounded and needed dressing from time to time.

4 The uniform grit on the belts gives a much better finish on the tubes than did the rolled-on grit of the set-up wheels.

Manufacturers of hundreds of different industrial and consumer items have proved that the backstand belt method is more efficient and more economical than the set-up wheel.

If you are grinding, polishing or finishing flat or contoured surfaces, cast pieces, stamped pieces or forged pieces, the backstand belt method can help you with your production problems.

To learn more about the many advantages of the backstand belt method, write today for our free booklet.

We recommend buying through your industrial distributor

MAIL THIS COUPON TODAY

Please send me the booklet "Facts about Backstand Belt Grinding and Polishing."

Name .....

Title .....

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Address .....

City ..... *Zone* ..... *State* .....

Armour's abrasive belts are only part of a complete line of abrasives built to rigid quality specifications. There are sheets, rolls, discs and other more specialized shapes.

ARMOUR *Coated Abrasives Division*

SHEETS • ROLLS • BELTS • DISCS

Armour and Company
North Benton Road • Alliance, Ohio

NATCO MARKS A HALF CENTURY OF CONTRIBUTION TO INDUSTRIAL ADVANCEMENT

If you could look on the inside of thousands of manufacturing plants throughout the world, you would see NATCO machines busy drilling, facing, boring and tapping billions of large and small holes in parts destined for everything from automobiles, trucks and tramp steamers to radios, electric motors and home appliances.

All these things are a part of tremendous scientific industrial advancement made possible through the combined effort of machine tool builders and American Industry. With the turn of the half century into the atomic age of the present, every man and woman in the NATCO organization is proud of his part in this fifty-year record and glad to look ahead to the opportunity of serving industry and the forces of freedom in the years to come.

Golden Anniversary

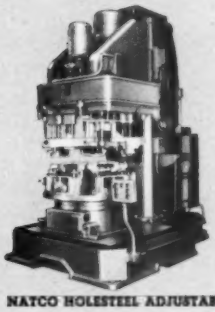
1901 NATCO 1951

NATCO OFFERS

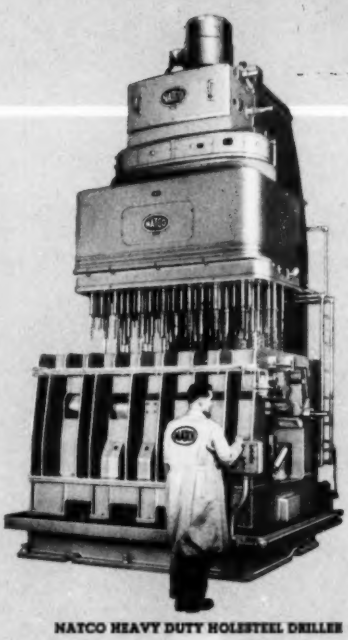
50 Years Experience

IN BUILDING A COMPLETE RANGE OF DRILLERS, BORERS, FACERS AND TAPERS

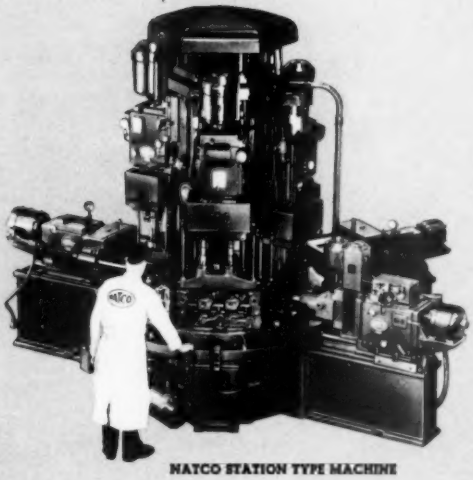
NATCO LIGHT SENSITIVE DRILLER AND TAPPER



NATCO HOLESTEEL ADJUSTABLE DRILLER AND TAPPER



NATCO HEAVY DUTY HOLESTEEL DRILLER



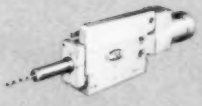
NATCO STATION TYPE MACHINE

Out of the past fifty years of NATCO experience has come a deeper understanding of today's engineering and production problems.

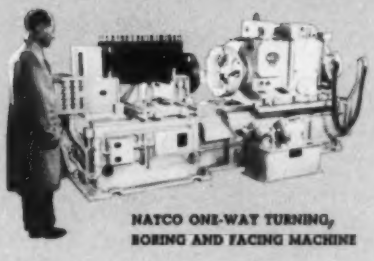
By reason of this maturity of understanding the NATCO organization is better equipped to help you solve your drilling, boring, tapping and facing problems. Better equipped with experienced engineers and designers. Better equipped with the most complete range of adjustable and fixed center multi-spindle machines in the world.

A few of the various NATCO machines are illustrated above. As you can see they range from small, fast, light-sensitive multi-drillers and tappers to large automatic processing machines . . . from single spindle

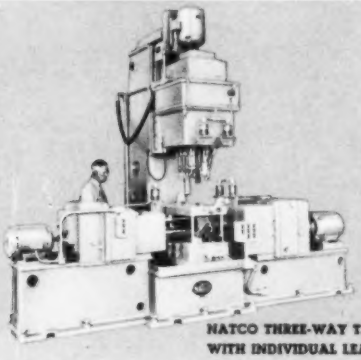
NATCO HIGH SPEED SENSITIVE DRILLER AND TAPPER



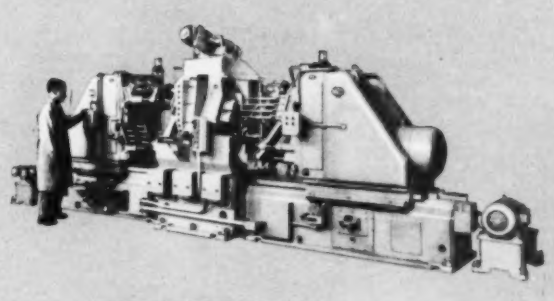
NATCO HIGH SPEED SENSITIVE UNIT



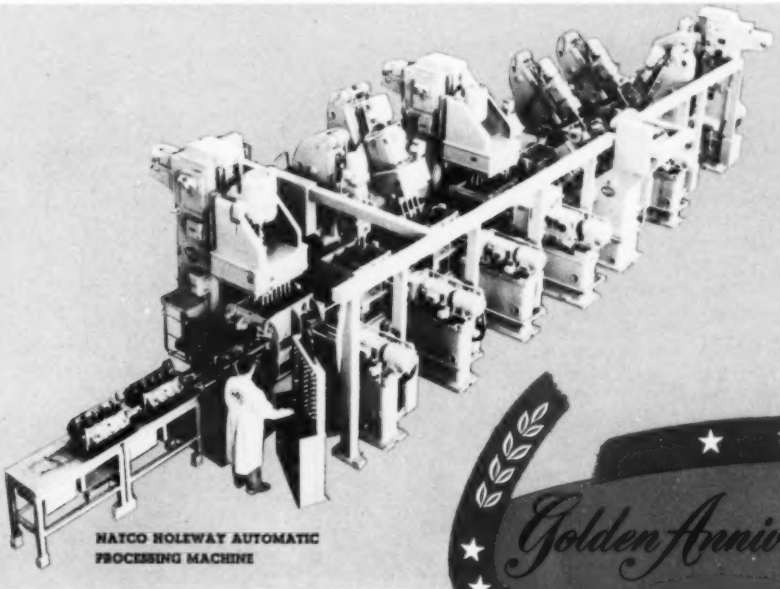
NATCO ONE-WAY TURNING, BORING AND FACING MACHINE



NATCO THREE-WAY TAPPER WITH INDIVIDUAL LEAD SCREW



NATCO THREE-WAY TRUNNION TYPE DRILLING MACHINE



NATCO HOLEWAY AUTOMATIC PROCESSING MACHINE

to an unlimited number of spindles, from one direction to any number of directions, vertical, horizontal or angular, special or standard and operations range from 1/16" drill to 14" or larger bore. The materials worked include iron, steel, bronze, aluminum, wood and plastic.

Golden Anniversary

1901 NATCO 1951

NATCO production, sales and service facilities have grown also during the past fifty years to keep in step with the times.

Since 1901, from a small well organized plant, NATCO's main engineering and production buildings have been enlarged to cover an entire city block . . . and still more engineering and production space is being completed this year.

To serve you still better, NATCO maintains several complete engineering departments with full complements of engineers, draftsmen and sales and service personnel. Branch offices are conveniently located in Detroit, Chicago, Buffalo, and New York City.

And so NATCO not only offers you better machines backed by fifty years' experience, but ample production and engineering facilities.

These are the reasons why we say . . . to solve your problems in drilling, boring, facing and tapping most economically . . .

Call a Natco Field Engineer

NATIONAL AUTOMATIC TOOL COMPANY, INC.
Richmond, Indiana, U. S. A.

Branch Offices

Chicago Office	1809 Engineering Bldg., CHICAGO
Detroit Office	409 New Center Bldg., DETROIT
Buffalo Office	1807 Elmwood Ave., BUFFALO
New York Office	2902 Commerce Bldg., NEW YORK CITY

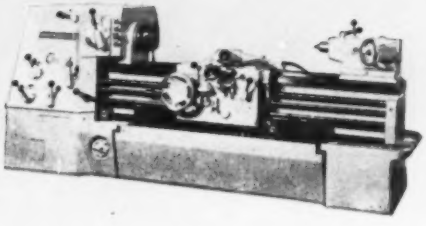
REPLACE With SPRINGFIELD

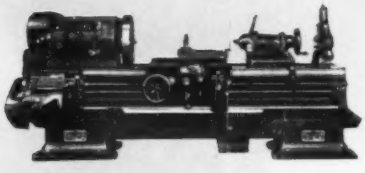
LATHES

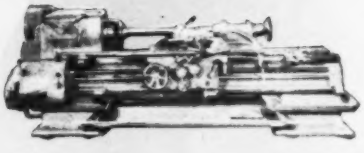
handle a wider range of work—

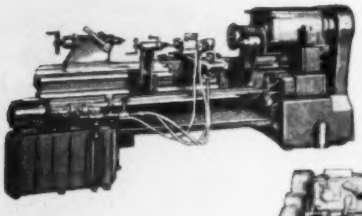
increase output—

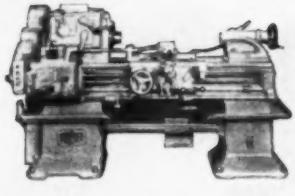
lower operating costs











TURNING
CONTOURING
PROFILING
ENGRAVING
REPRODUCING
BORING
THREAD CHASING
RELIEVING

14" to 32" sizes for heavy manufacturing operations or sensitive tool room work

THE SPRINGFIELD MACHINE TOOL COMPANY

SPRINGFIELD, OHIO, U. S. A.

GENERAL DISTRIBUTORS: BRYANT MACHINERY & ENGINEERING COMPANY, 400 WEST MADISON ST., CHICAGO 6

Exclusive Representatives in All Principal Cities

NIAGARA

NEW

This most revolutionary improvement in press design since Niagara introduced the world famous sleeve clutch in 1934 has been in the process of development and testing for many years. It is patented and there are patents pending.

Its high hourly output . . . its sturdiness . . . its simplicity . . . its labor saving and maintenance economies . . . its safety features . . . are amazing.

PRESENTS

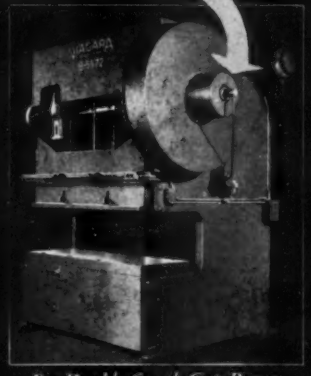
SLEEVE CLUTCH

electrically controlled air actuated

DeLuxe Control

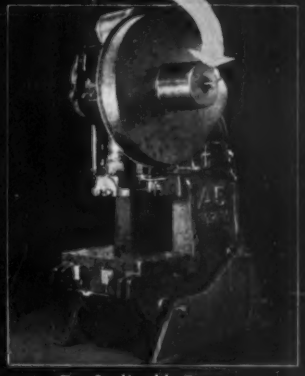
Note each one of these outstanding features:

1 Has all the advantages of a friction clutch.
2 Has all the advantages of a Sleeve Clutch.
3 Can be engaged or disengaged at any point in the stroke.
4 Can be jogged through the full 360° of crankshaft travel.
5 Can be stopped instantly, regardless of position of crank, by stop button, electric eye, limit switch or high frequency electric field.
6 Can be operated by palm buttons, foot switch or push buttons.
7 Can be operated single stroke or continuous.
8 Provides positive drive.
9 Has no friction members to wear.
10 Generates no heat.
11 Has low air consumption.
12 Makes instant engagement.
13 Provides effortless operation.
14 Is located on outside of drive wheel.
15 Can be completely removed without taking off the drive wheel.
16 Drive wheel next to frame . . . minimum overhang.
17 Drive wheel runs on antifriction bearings.
18 Gears and clutch run in a bath of oil.
19 Has few moving parts. Integral jaws and splines.
20 Presses so equipped are provided with air releasing brake.



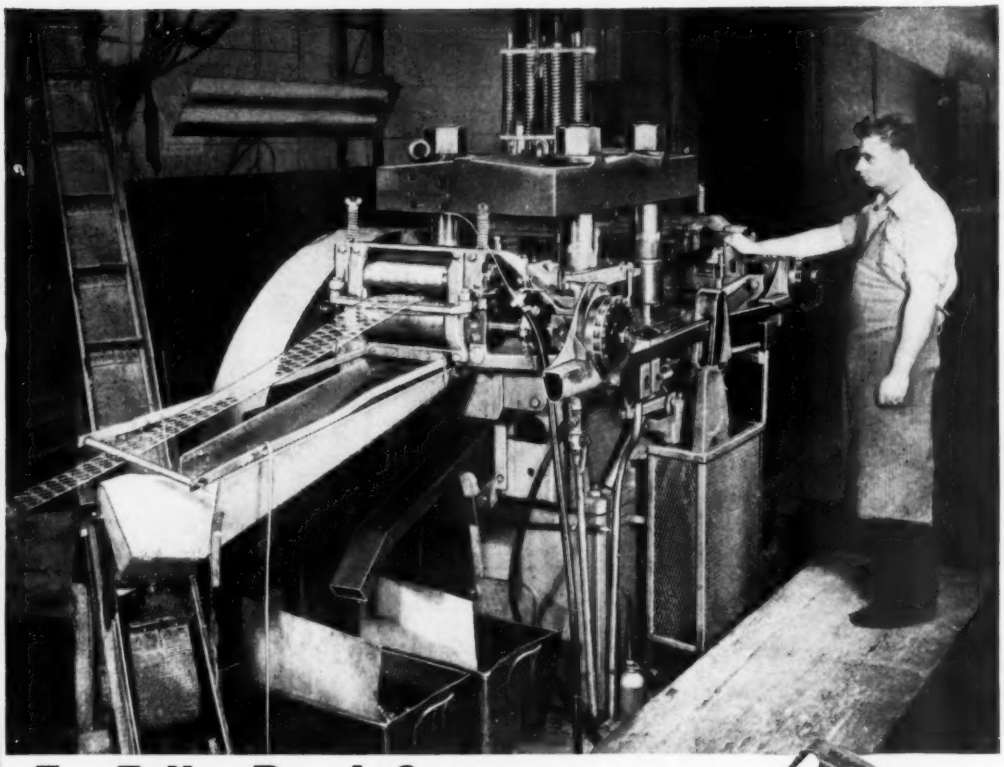
For Double Crank Gap Presses

For Straight Sided Presses



For Inclinable Presses

NIAGARA MACHINE AND TOOL WORKS, BUFFALO 11, NEW YORK
DISTRICT OFFICES: DETROIT, CLEVELAND, NEW YORK



For Fuller Brush Company

Above illustration shows the 150-ton Henry & Wright Dieing Machine used by Fuller Brush Company to produce stampings, ring knobs, mop hinge clasps and other metal parts. Complete-per-stroke Henry & Wright progressive dieing machines set production records wherever they are installed. Yet get more stampings per hour, per square foot of space. Scrap losses are minimized. Henry & Wright machines not only produce at high speeds — their unique design increases die life by as much as 1200%.

Only the best is

PRODUCTS OF OUR ASSOCIATES INCLUDE:

PREMIUM QUALITY STAMPING PRESSES

THE V & O PRESS CO.
Division of Hartford-Empire Company
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Hartford-Empire Company
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Division of Hartford-Empire Company
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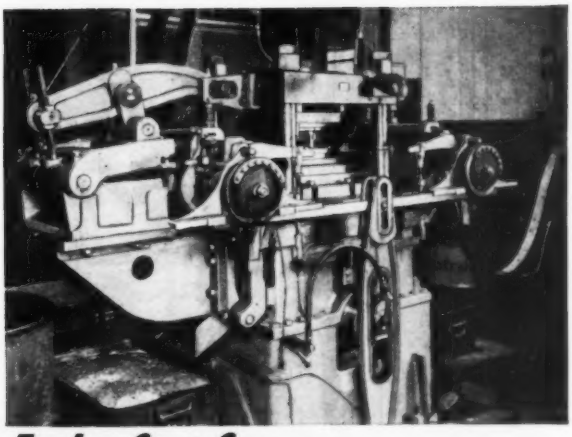
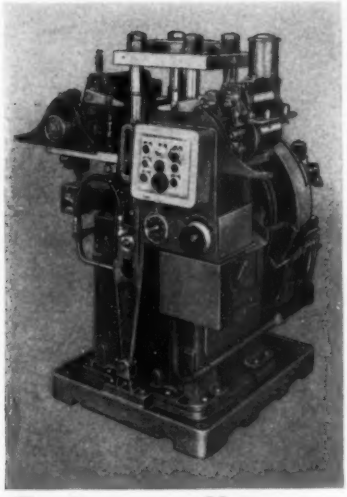
PLASTIC BOTTLES, RODS, TUBES, SPECIAL SHAPES

PLAX CORPORATION
Subsidiary of Hartford-Empire Company
HARTFORD 1, CONNECTICUT



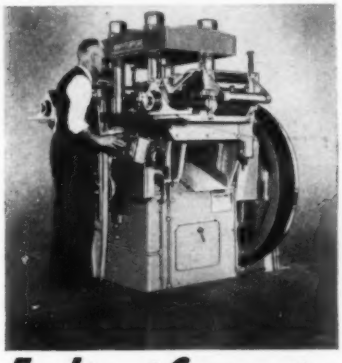
For Lux Clock Company

where Henry & Wright Dieing Machines get "practically every part we can put on a press." Lux keeps its seven H & W machines running "13 hours a day, seven days a week". Scrap loss is estimated at less than half of what it would be on other presses. Die life is doubled.



For Imperial Knife

Company, where four 25-ton Henry & Wright Dieing Machines do a fast, economical and efficient job of fabricating parts for pocket knives.



For Lionel Corporation

Installation, consisting of four 25-ton, seven 50-ton and one 75-ton Henry & Wright Dieing Machines, turns out transformer laminations and other parts.

good enough

FACT PACKED CATALOG
Complete descriptions of all Henry & Wright Dieing Machines. Write: Henry & Wright, 480 Windsor St., Hartford 5, Conn.

Henry and Wright

H&W

HENRY & WRIGHT
Division of Hartford-Empire Company

Recover "Change-Over"

COMPLETE YOUR UNION DRAWN "POCKET LIBRARY" NOW!

Like to learn more about Steel Bars for Carburizing? . . . about Furnace Treatment? . . . Shafting? . . . Bessemer Steels? . . . or, the new "X" Steels? The information all is here in these six pocket-sized Union Drawn Booklets. Write for your free copies, today.

Production Losses

through this improved

MACHINABILITY

Tooled up now and ready to run? But . . . already weeks behind projected schedules due to time lost in changing over production? You still may recover much of that lost ground. Better MACHINABILITY in the steel bars you use for mass-producing parts can help you get the *extra* production needed to whittle backlogs.

Better and better steel bar MACHINABILITY has been the single goal of Union Drawn metallurgists and metal-working experts for over 60 years. In mills, laboratories and customers' plants . . . at the controls of automatics . . . they've acquired an unequalled knowledge of MACHINABILITY. This, in turn, has led to the development of new fast-machining steels and to a year-by-year improvement in Union Cold Drawn Steels.

This wealth of experience is vital to you today. It can help you recover change-over production losses in the shortest possible time. It's the reason why today's Union Cold Drawn Steels offer you the uniform MACHINABILITY that means top ratings on feeds and speeds . . . longer tool life, with fewer grinds . . . smooth, bright machined surfaces . . . freedom from abrasive elements . . . higher production efficiency . . . increased output.

Feeding your present machine tools a steady diet of Union Cold Drawn Bars will help keep them operating at peak efficiency. The same diet for your new tools as they arrive will assure your realizing all the production built into them.

And, remember, the services of competent Union Drawn Field Metallurgists always are at your disposal to help solve change-over problems. Just call your nearest Republic District Sales Office, or write us:

REPUBLIC STEEL CORPORATION
Union Drawn Steel Division · Massillon, Ohio
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, N. Y.

THIS NEW FAST-MACHINING STEEL MAY STEP-UP YOUR PRODUCTION, TOO

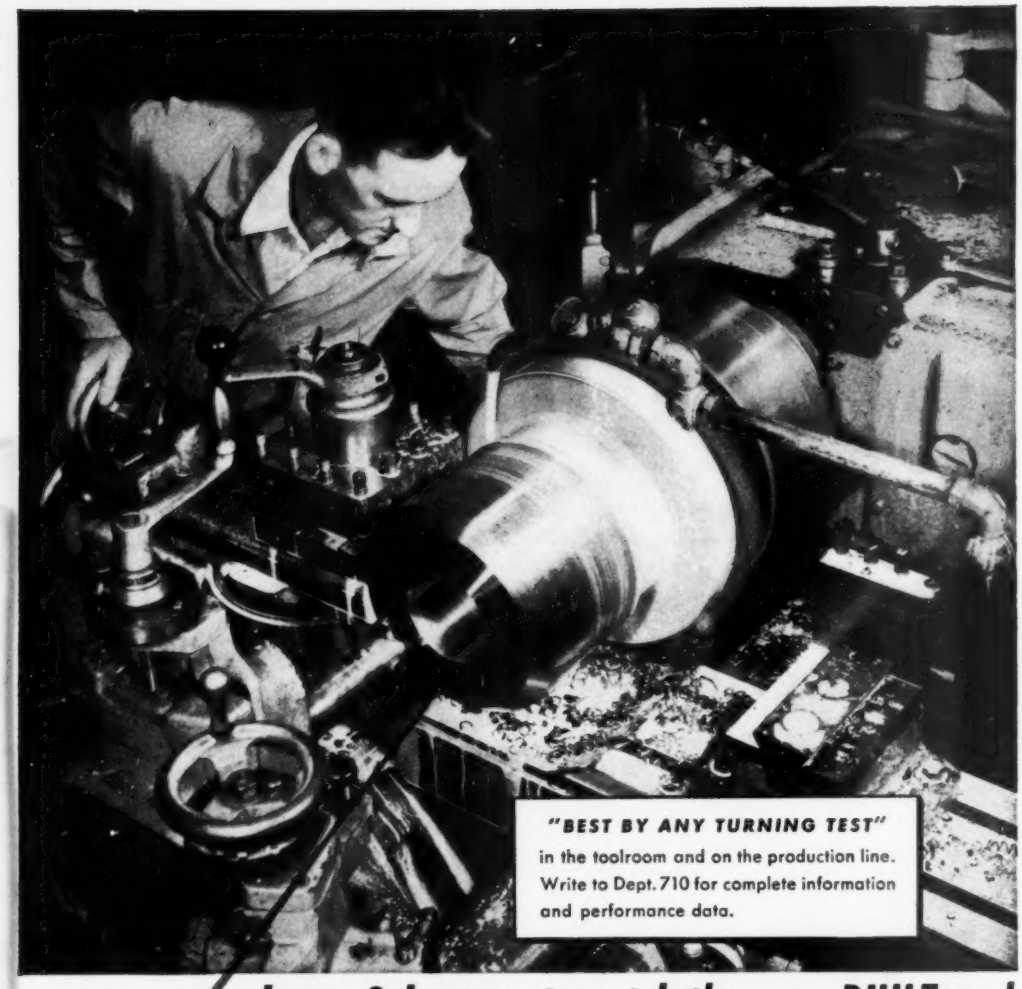
Where the design of your steel parts and the type of equipment you use are such that even higher speeds and longer tool life are practical from cost and production standpoints, here's a new Bessemer Screw Steel that may be just what you need. It's B-1113X. A Union Drawn Field Service Man will be glad to tell you all about it.

Republic
REPUBLIC STEEL
UNION COLD DRAWN
STEELS

Free-Machining Bessemer, Alloy and Enduro Stainless Steels

Union Cold Drawn Special Sections

Union Cold Drawn and Ground Rounds; Turned and Polished Rounds; and Turned, Ground and Polished Rounds (Union Precision Shafting)


"BEST BY ANY TURNING TEST"
in the toolroom and on the production line.
Write to Dept. 710 for complete information
and performance data.

Jones & Lamson turret lathes are BUILT and

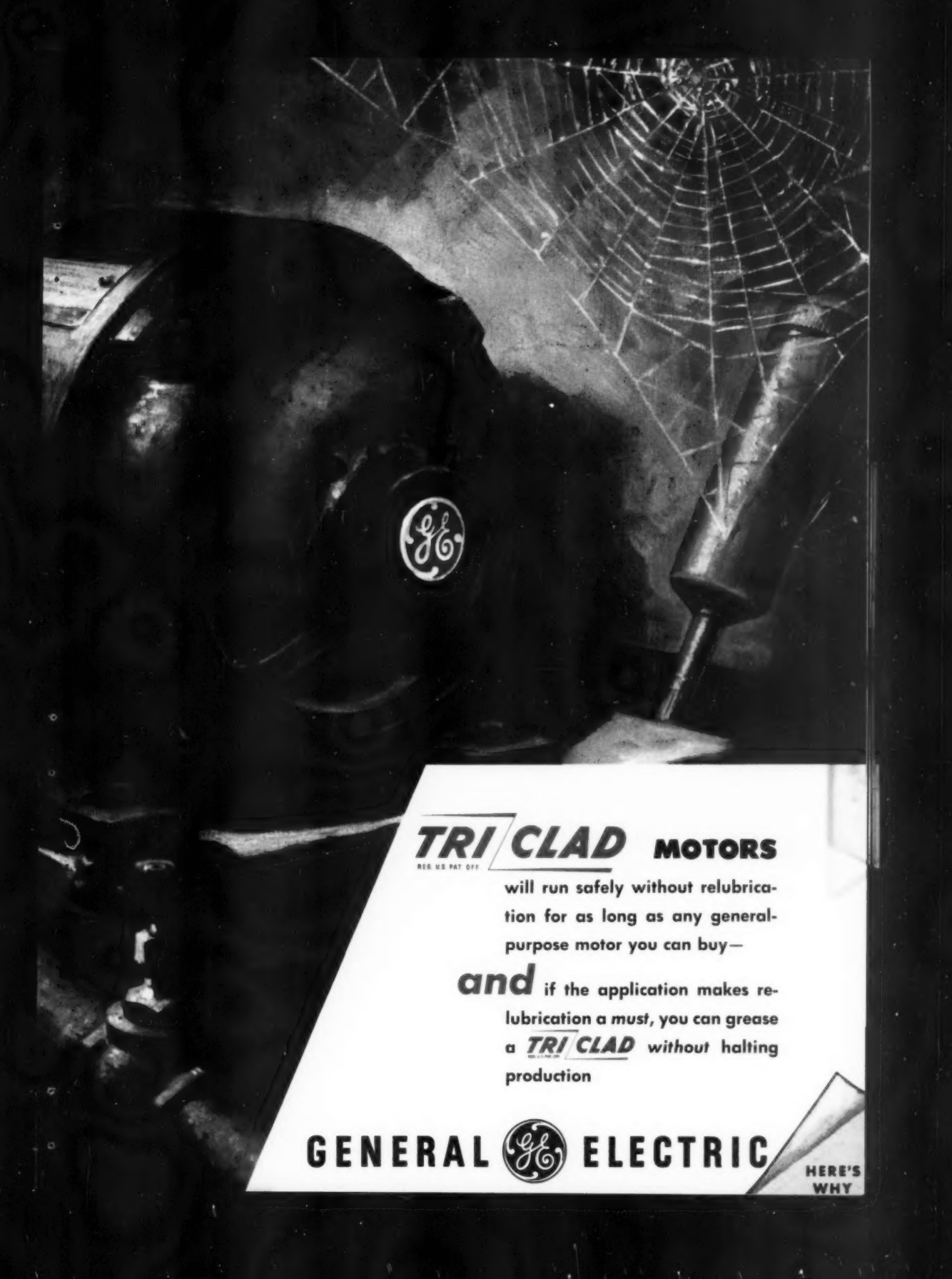
POWERED TO PRODUCE

MORE CHIPS **per tool**
MORE PIECES **per hour**
MORE PROFIT **per job . . . than any turret lathe of comparable size!**

Turret Lathe Division

JONES & LAMSON
MACHINE COMPANY
Springfield, Vermont, U.S.A.

MACHINE TOOL CRAFTSMEN SINCE 1835


TRI CLAD MOTORS
REG. U.S. PAT. OFF.
will run safely without relubrication for as long as any general-purpose motor you can buy—
and if the application makes relubrication a must, you can grease a TRI CLAD without halting production
GENERAL ELECTRIC
HERE'S WHY

TRI CLAD MOTORS will run safely without relubrication for as long as any general-purpose motor you can buy—

Tri-Clad extra lubrication "protection" can save you money because:

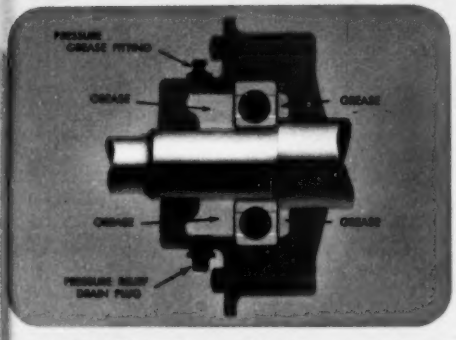
1. Tri-Clad's oversize grease reservoir and the heaviest standard-service bearings mean you do not have to bother with greasing between motor check-ups.

2. When relubrication is needed on those tough applications, you can grease a Tri-Clad without interrupting production-line operations.

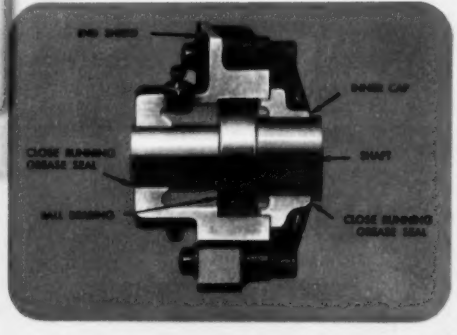
Tri-Clads are grease-gun easy to lubricate *on the job*. Moreover, a Tri-Clad motor will run safely where an ordinary motor would fail. Chances are you'll be spared the cost of a "special" motor.

YOU BE THE JUDGE! The best way to prove to yourself that Tri-Clad gives you the most for your motor dollar is to contact your local G-E office. Tri-Clad stocks are complete. *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*

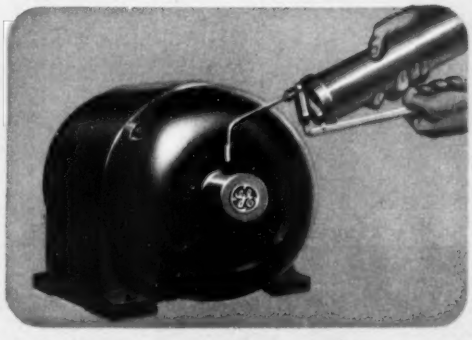
1 **EXTRA BEARING PROTECTION** — Tri-Clad gives you extra bearing protection because heaviest standard-service bearings are carefully selected to withstand severe loads for long periods.



2 **EXTRA GREASE** — Four times the ordinary amount of grease is packed into the large Tri-Clad grease reservoir. Since bearing life depends on grease, this means that Tri-Clad motors will run safely for years — for as long as any general-purpose motor you can buy.



3 **SEALED-IN BEARINGS** — Bearings and grease are completely sealed in a cast housing with *long* running seals for extra protection from dirt, dust, and lubricant leakage.



4 **PRESSURE-RELIEF GREASING** — An efficient system of pressure-relief lubrication (with standard fittings) enables a Tri-Clad motor to be quickly and easily greased on the job when and if it's needed.

GENERAL ELECTRIC

752-3

Faster production at lower cost

New

MODERN COLLAPSIBLE TAPS

FOR EITHER STATIONARY OR ROTARY USE

- Easy and quick adjustment. No special tools required.
- Interchangeable shank for convenience in changing from one machine to another.
- Thread length setting undisturbed by diametrical adjustment.
- Extra rigidity with unusually sensitive collapse.
- Simple in design. No complicated mechanisms.
- Heavy chasers for greater strength. Chaser threads precision ground.
- All parts hardened and ground and precision fitted.

Modern Precision Tools Include . . . . .

STATIONARY SELF-OPENING DIE HEADS
ROTARY SELF-OPENING DIE HEADS
STATIONARY COLLAPSIBLE TAPS
ROTARY COLLAPSIBLE TAPS
MODERN-MAGIC CHUCKS AND COLLETS
SELF-OPENING STUD SETTERS
INSERTED BLADE FACE MILLING CUTTERS
SOLID ADJUSTABLE DIE HEADS
ADJUSTABLE HOLLOW MILLING TOOLS
UNIVERSAL CHASER GRINDING FIXTURES

Send for full information on this new improved Modern Collapsible Top and its cost reducing possibilities applicable to your tapping

MODERN TOOL WORKS

DIVISION OF
CONSOLIDATED MACHINE TOOL CORPORATION
ROCHESTER 10, NEW YORK

The First Really New Lathe Since Lathes Began

THE FIRST DEPARTURE IN BASIC ENGINE LATHE DESIGN

The First Totally Different Lathe in Over 100 Years...

Now **ELIMINATES MAKESHIFT MACHINING OF SHORT, LARGE DIAMETER, THIN-WALLED WORK PIECES!**

In the opinion of practical men from many branches of industry and leading metalworking publication editors, the problem of facing, turning and boring thin-walled section work of large diameter and short length has been solved. The Lodge & Shipley T-Lathe, "a radically new 60" right angle chucking lathe," eliminates the slow, costly, inaccurate and inconvenient use of raised or gap engine lathes or vertical boring mills on this class of work.

With speed, sensitivity, accuracy and accessibility formerly thought impossible, the T-Lathe is far more compact, far less expensive than conventional machines. The bed is in the shape of a "T." The section of the bed carrying the carriage is at right angles to the center line of the lathe.

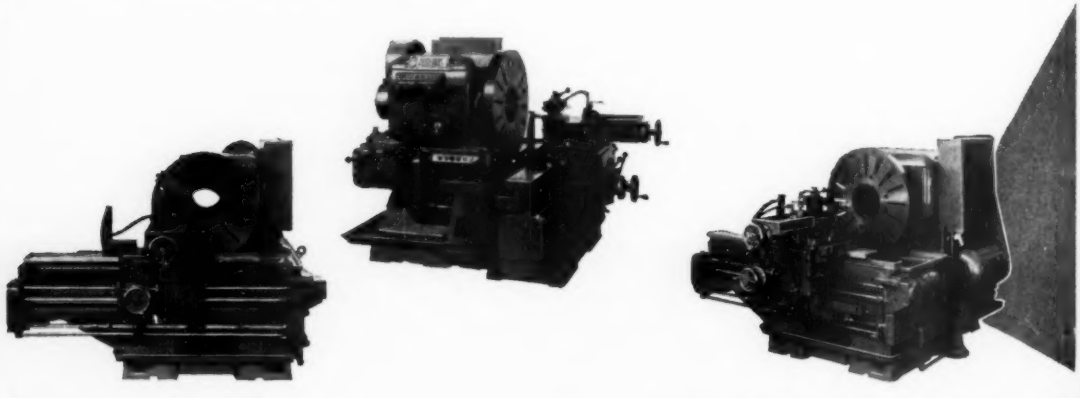
The Lodge & Shipley T-Lathe is not a single purpose machine. Developed by Lodge & Shipley in conjunction with Pratt & Whitney Experimental Div., one of the nation's leading turbo-jet engine manufacturers, for use on jet engine shrouds and similar parts, it is extremely versatile. Also, this lathe has been designed for tracer control and variable speed drive if required.

At last, by the application of this new Lodge & Shipley T-Lathe, you can machine with maximum efficiency a wide range of thin-wall, short length work of varying diameter.

Perhaps you can use the T-Lathe profitably. Write for detailed information.

THE **Lodge & Shipley** COMPANY
MACHINE TOOL DIVISION • 3055 COLERAIN
CHOREMASTER DIVISION • 800 EVANS ST.
CINCINNATI 25, OHIO

© The Lodge & Shipley Co., 1951



The

Lodge & Shipley "T" Lathe!

60" RIGHT ANGLE CHUCKING LATHE

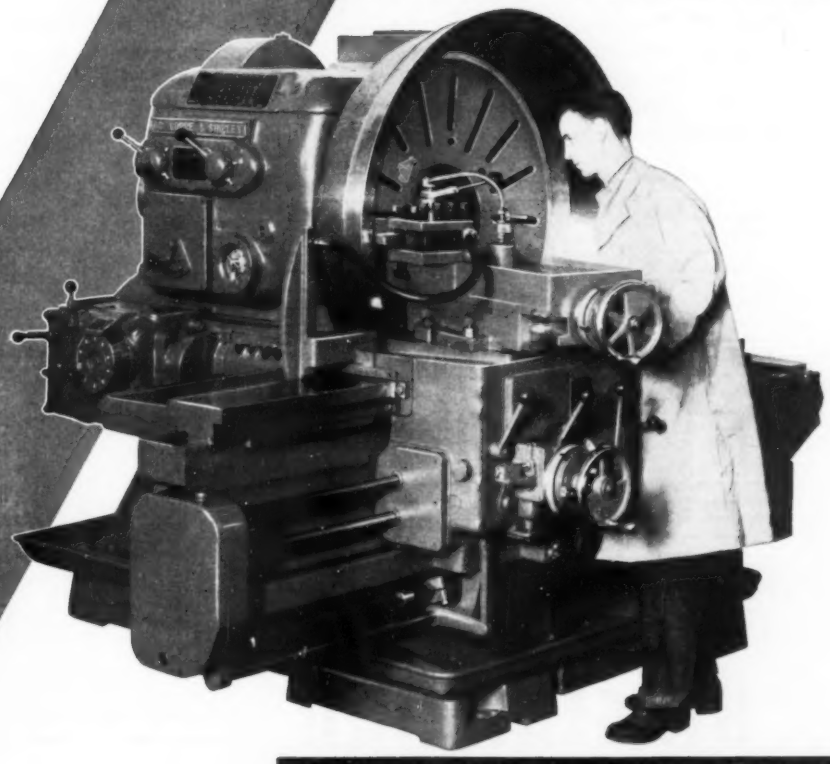


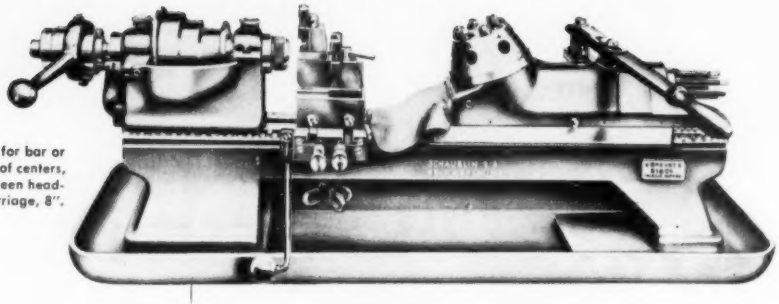
Illustration above shows Pratt & Whitney stainless steel jet engine shroud. Dimensions are: 48" diameter, 10" wide and 2" wall thickness.

Want more information about the T-Lathe and how aircraft engine, marine and other industries plan to use it? Write for detailed specifications and information or have our engineer call on you.

Can You Use The Lodge & Shipley *T*-Lathe?

If you machine large, short length work, the T-Lathe may eliminate makeshift machining for you. The T-Lathe can be supplied with 4 different headstocks and other modifications to suit your work. Check these condensed specifications for model illustrated.

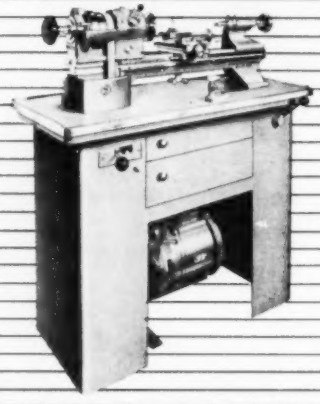
Maximum swing . . . . . 60"	Std. maximum length of workpiece . . . . . 12" to 15"
Diameter of std. face plate . . . . . 37"	Std. range of spindle speeds . . . . . 24 speeds: 4-225 RPM
Facing carriage travel . . . . 31" to front, 6" to rear	Std. range horsepower ratings . . . . . 4 HP @ 4 RPM, 15 HP @ 14-225 RPM
Compound rest travel . . . 12" forward, 4" back	Range of feeds . 55 feeds: .001" - .064"
Compound swivel range . . 90 degrees	



SV 70 Turret Lathe for bar or chuck work. Height of centers, 2.8". Distance between headstock and turret carriage, 8".

SCHAUBLIN

These SV Machines fully warrant your inquiry for complete information. They have contributed greatly toward winning for the Schaublin line a fine reputation for the adaptability and precision that are highly prized by toolmakers. Factory service, interchangeable units and accessories are available from American warehouses. Consult us on your tool-making problems.



SV 102 Toolmakers' Lathe for which great variety of independent and interchangeable units and accessories are available.

SV 12 High-Precision Milling Machine—one of five different types. Table sizes 4-23/32 X 16-1/2" to 10 X 43-5/16".

SCHAUBLIN DIVISION

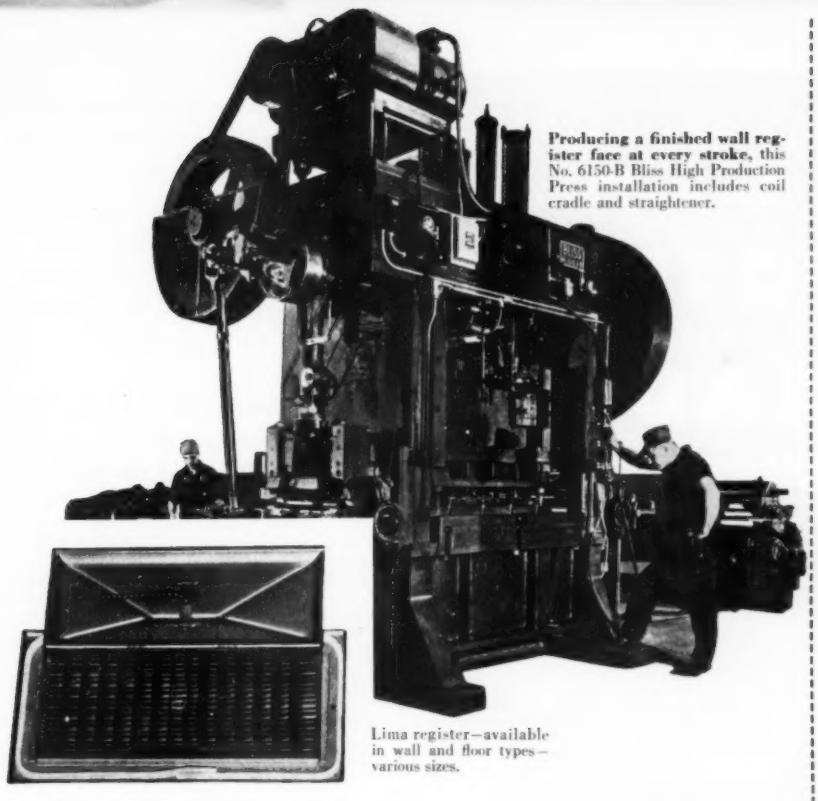
CARL **HIRSCHMANN** CO.

affiliated with **Hauser Machine Tool Corp.**
30 Park Avenue, Manhasset, N.Y.
Representatives in Principal Cities

EXCLUSIVE U.S. AGENTS FOR TORNOS WORKS, LTD.; SCHAUBLIN, S.A.; LAMBERT, S.A.; SAFAG, S.A.; AND AGATHON, LTD.

At 30 Park Avenue, Manhasset, N. Y., is the widest selection of Swiss precision machine tools available from any one address in the United States. Offered here by Carl Hirschmann Co. are Tornos Screw Machines and Cam Making Machinery; Schaublin Lathes, Collets, Milling Machines and Drilling and Tapping Machines; Lambert Gear Generating Machines and Thread Cutting Machines; Safag Automatics for Wheel and Pinion Cutting, Form Cutter Milling, and Cutter Backing Off; and Agathon Grinders and Die Sets. Offered by Hauser Machine Tool Corp. are Hauser Jig Borers, Jig Grinders, Optical Measuring Machines, Profile Projectors and Burnishing Machines.

SWISS *PRECISION CRAFTSMANSHIP* **SWISS** *DEPENDABILITY ACCURACY*



Producing a finished wall register face at every stroke, this No. 6150-B Bliss High Production Press installation includes coil cradle and straightener.

Lima register—available in wall and floor types—various sizes.

5 Bliss Automatic Presses at Lima Register Co. equal output of 65 hand-fed

COST OF VALVE IS 1/25th THAT OF HAND-FED PART

It's a fact! In choosing equipment and methods to produce stampings for the famous Lima Register, Bliss and Lima engineers agreed that 5 Bliss presses set up for automatic operation would equal the output of 65 hand-fed presses.

Now, 18 months later, the plant is in full production and the 5 Bliss presses are turning out all the stampings required.

Two Bliss High Production Presses with progressive dies and Bliss coil cradles handle the bulk of the production. Stamping runs of 15,000 or more are assigned to these presses. Bliss Inclinable Presses with roll feeds are exactly suited for the production of a variety of small-lot stampings.

An example of the unusual savings achieved by Lima is the floor register valve. Formed complete—80 a minute—in a Bliss No. 675 High Production Press, it costs only 1/25th of a hand-fed stamping.

Similarly, high savings are obtained on all stampings produced on Bliss automatic presses.

If your stamping runs are 50,000 or more ask Bliss engineers how High Production Presses can increase your profits. Your nearest Bliss representative will be glad to talk about converting your hand-fed stampings to automatic operation.

E. W. BLISS COMPANY, CANTON, OHIO

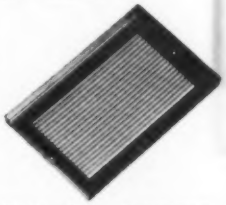
Valve for floor register...80 per minute...20 gauge steel...675 Bliss High Production Press.

Body slide...80 per minute...20 gauge steel...675 Bliss High Production Press.

Short border...75 per minute...16 gauge steel...6150 Bliss High Production Press.

Sliding channel...100 a minute ...20 gauge steel...675 Bliss High Production Press.

Hinge angle...100 a minute...20 gauge steel...675 Bliss High Production Press.



Cold air face...40 a minute... blanked on 6150 Bliss High Production Press; formed on 21½ Bliss Inclinable Press.

Chain clip...100 a minute...24 gauge steel...Bliss 21-B Inclinable Press.

BLISS BUILT

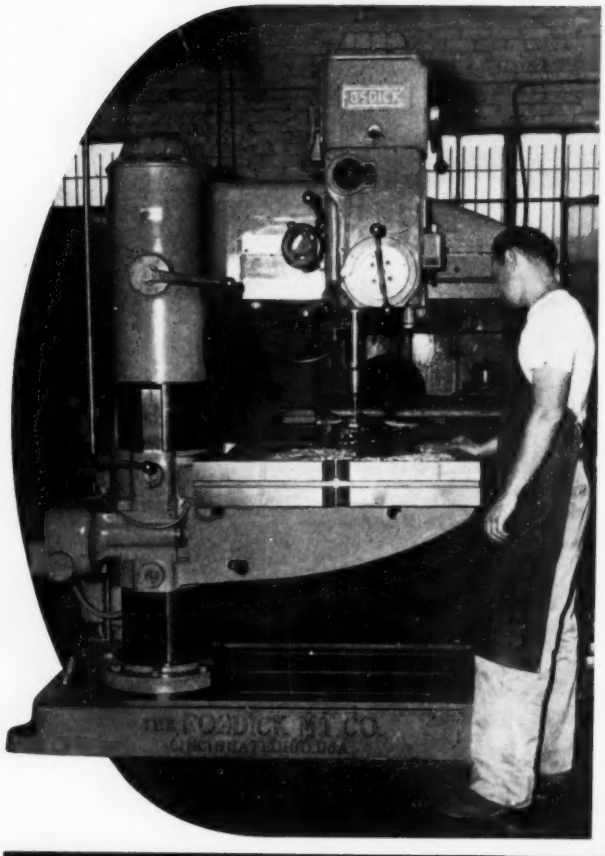
FROM THE RIGHT PRESS FOR A GIVEN JOB

...TO A COMPLETE PRESS ROOM...

It's Bliss

A practical machine for Sensitive Drilling

FOSDICK SENSITIVE RADIAL



• Where the work is small and numerous holes are to be drilled the FOSDICK Sensitive Radial is an ideal machine. Moderately priced — it is designed to provide maximum production with the least amount of effort on the part of the operator.

For example all controls for feeds and speeds and movement of the head on the arm are centralized on the head for the convenience of the operator.

The Arm is located at a fixed height within easy reach of the operator at all times. In addition to the conventional Radial Drill Base the Machine has an adjustable table. Both the table and the arm swing in an arc of 360°.

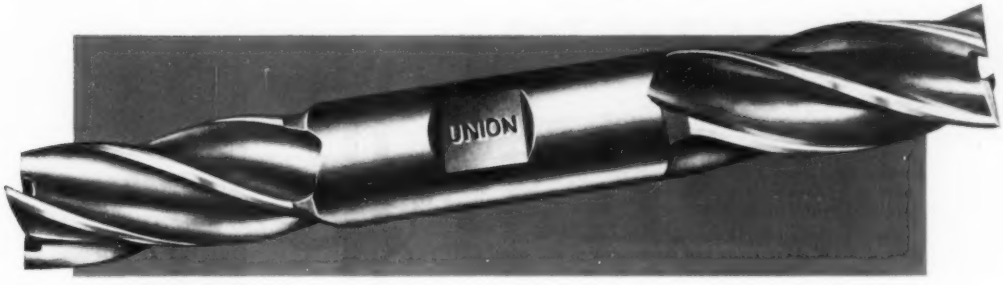
If you have sensitive drilling operations, requiring holes up to 1½ inch diameter you should investigate the Fosdick Sensitive Radial.

Full descriptive bulletin available.
Write for Fosdick Sensitive Radial bulletin S. R. A.

FOSDICK MACHINE TOOL CO.
CINCINNATI 23, OHIO

You cut costs as well as metal... with UNION *end mills*

UNION DOUBLE-END END MILLS are available with four flutes — as illustrated — or two flutes, in standard or small-diameter sizes. All in high speed steel.



BUILT FOR MAXIMUM ECONOMY, Union end mills provide top performance throughout the range of end milling operations. Made of high speed steel, they have the smooth, free-cutting action that saves power, while their great strength reduces breakage to a new low. And all Union solid type end mills of ½" diameter or over have deep counterbores, considerably lengthening their resharpening life. In fact, as with all Union cutting tools, every detail of their design and construction is the result of up-to-the-minute tool engineering that saves you time, labor and money . . . *And that's worth specifying!*

THERE'S A TYPE OF UNION END MILL FOR EVERY PURPOSE

Taper Shank	**Single End**
Straight Shank	**Double End**
Shell	**Ball End**

Union is also prepared to make special types of end mills to your specifications.

no other end mill will outperform a UNION

contact your local distributor

His name is listed in Union's THOMAS' REGISTER insert under "Drills, Twist."

UNION TWIST DRILL COMPANY, ATHOL, MASSACHUSETTS

Milling Cutters · Gear Cutters · Twist Drills · Hobs · Reamers · Carbide Tools

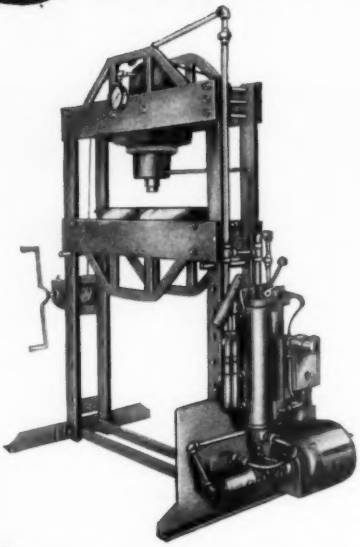
We own and operate S. W. CARD MANUFACTURING CO. Division, Mansfield, Mass. Taps, Dies, Screw Plates . . . BUTTERFIELD DIVISION, Derby Line, Vt., Taps, Dies, Screw Plates, Reamers . . . BUTTERFIELD DIVISION, Rock Island, Que., Milling Cutters, Twist Drills, Hobs, Reamers, Taps, Dies, Screw Plates.

...and we can do it again!

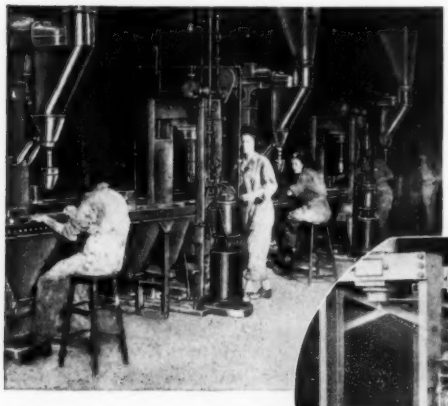
K. R. WILSON IS BACK ON AMERICA'S DEFENSE TEAM

NEW threats, new aggressions bring to mind the part KRW played in World War II. Navy ships equipped with machine shops had special 25 ton KRW Hydraulic Presses. Thousands of special air-oil operated ammunition loading presses were supplied to shell and bomb loading contractors. KRW presses speeded safe operations in the nation's largest arsenals. In fact, hundreds of industries helped to speed victory with KRW presses.

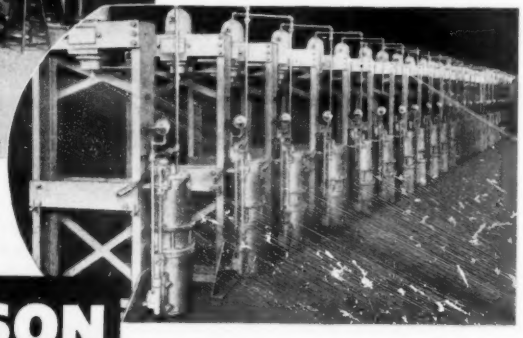
Now, unfortunately, America is threatened again. Here at KRW we're ready and determined to add our muscles to the nation's strength. All our facilities are at your disposal. If you need standard KRW presses, we'll get them to you right away. If you need specially-built presses, our engineering department will design them to your needs. Let us know! Write Dept. 11 for full information.



HERE'S the 37MD-1 KRW Hydraulic Press, ideally suited for trying out dies before sending them to production runs. KRW presses from 25-150 tons, hand operated, air operated or motor driven; one, two and three cylinder models; fast, flexible and self-contained above ground.

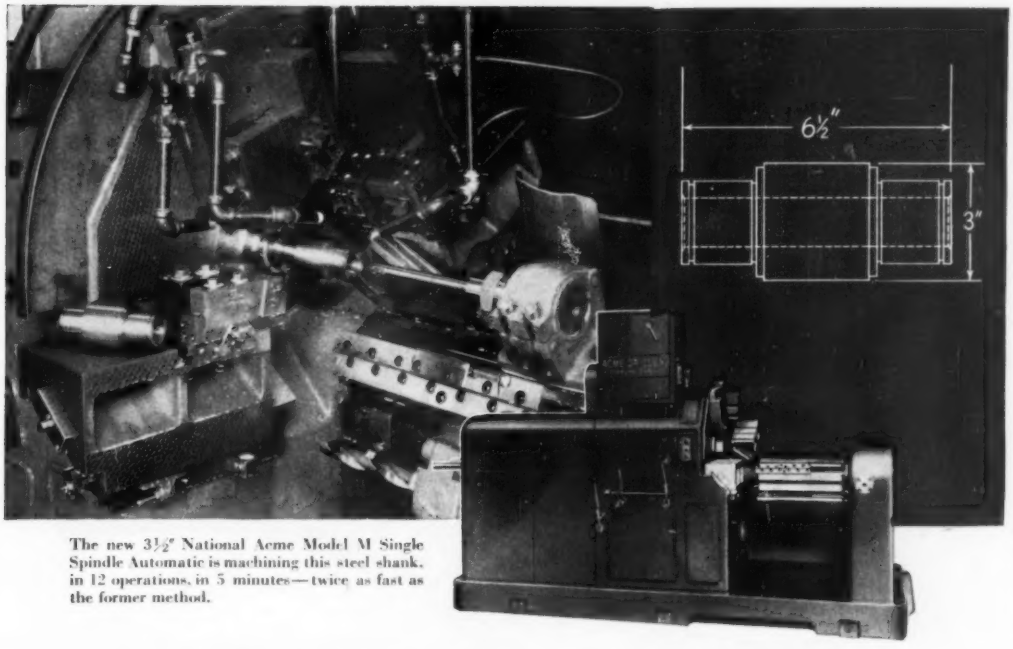


THOUSANDS of these special ammunition loading presses were used for safe shell loading during World War II. Let our engineers show you how KRW can speed production and cut costs for you.



K·R·WILSON

215 MAIN ST. · DEPT. 11 · BUFFALO 3, N. Y.



The new 3½" National Acme Model M Single Spindle Automatic is machining this steel shank, in 12 operations, in 5 minutes—twice as fast as the former method.

Steel Shanks Machined Twice as Fast

—AND TO .001 CONCENTRICITY

The new Acme-Gridley Model M Single Spindle Automatic has the strength to maintain close tolerances, such as the .002 total indicator reading for concentricity between the outside diameters and reamed hole of the steel shank illustrated. The rugged open frame provides plenty of room for chip clearance and for easy tool adjustment, too.

Frame strength adequate for high speed or carbide tools helps the Model M chalk up production records like this one. But that's only part of the Model M's time-saving story. Eight independently operated tool slides and three ranges of automatic spindle speeds permit the use of speeds and feeds best suited to each cut. Several short end operations can be performed while heavy forming cuts are being made from the side slides.

For increased production, increased *profit*, get the new Model M—tops for ease of operation, speed, stamina and economy. It's built in three capacities from 3½" to 5½". Ask for production estimates on your jobs.

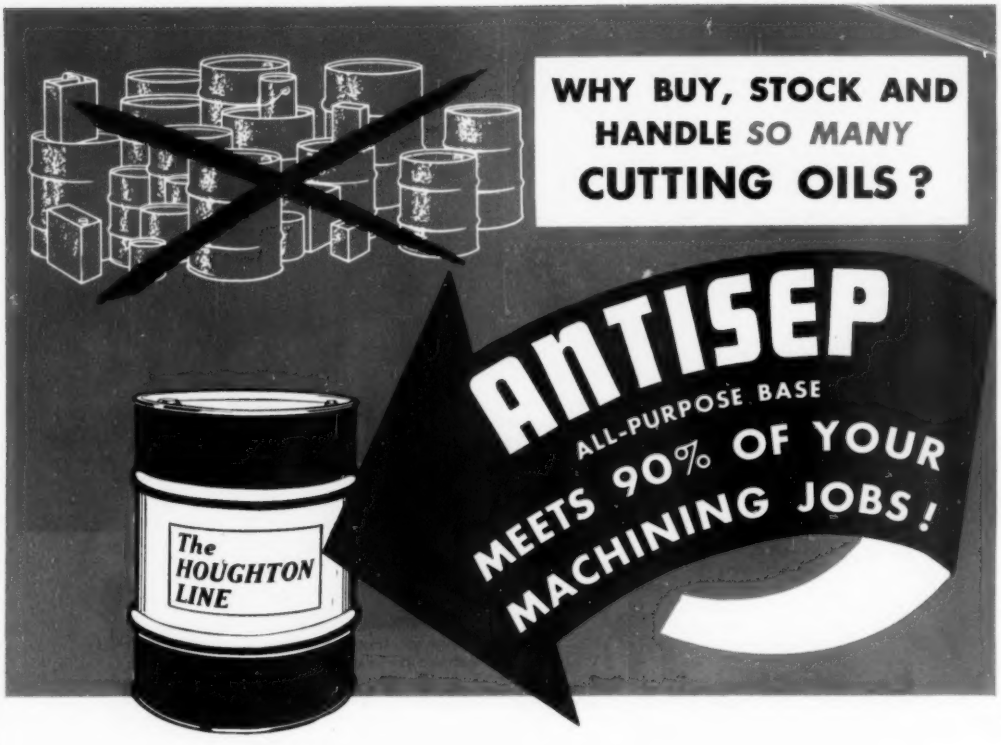
● Complete information on the new Acme-Gridley Model M Single Spindle Automatic is contained in Bulletin M-50. Ask for your copy.

Machine obsolescence is the creeping paralysis that strangles profits.

The NATIONAL ACME CO.

170 EAST 131st STREET · CLEVELAND 8, OHIO

Acme-Gridley Bar and Chucking Automatics: 1-4-6 and 8 Spindle • Hydraulic Thread Rolling Machines • Automatic Threading Dies and Taps • The Chronolog-Limit, Motor Starter and Control Station Switches • Solenoids Centrifuges • Contract Manufacturing



Just one base "across the board" for straight cutting, stamping and drawing —even automatics!

You can mix Antisep A. P. Base with just plain water—and meet almost all of your cutting needs. The number of cutting fluids you need is greatly reduced. Minimum handling, smaller inventory and less storage space are required.

Use Antisep A. P. Base for most difficult machining operations usually reserved for straight cutting oils. Its exceptional cooling ability, safety, assurance of fine finish and speedy production enable Antisep to handle Automatics as well!

Antisep A. P. Base, high in sulphur and fatty content, is antiseptically treated to eliminate rancidity and definitely reduce bacteria growth. It cleans from work easily in any mild alkaline bath or by standard degreasers.

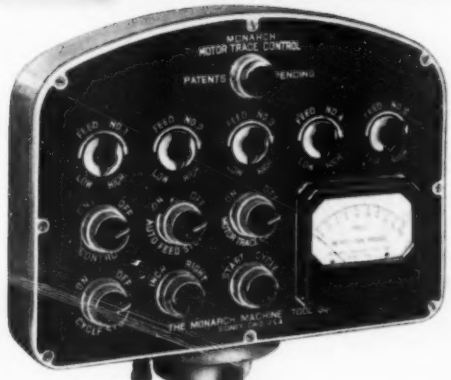
In tests and in use on toughest types of machining under all kinds of operating conditions, Antisep All-Purpose Base has proved to be more than satisfactory from every angle.

Ask the Houghton man to show you how you can reduce machining costs by using Antisep All-Purpose Base "across the board". Or write for bulletin and prices, to E. F. Houghton & Co., Philadelphia 33, Pa.

ANTISEP
. . . a product of

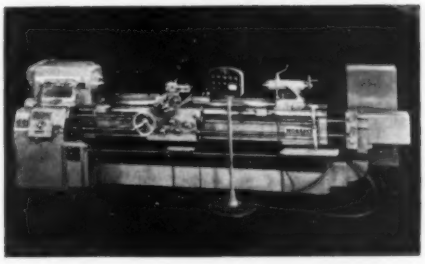
E. F. HOUGHTON & CO.
PHILADELPHIA · CHICAGO · DETROIT · SAN FRANCISCO

Ready to give you on-the-job service . . .



TURN TO MONARCH

MOTOR-TRACE TURNING



PRINCIPAL FEATURES

- Completely automatic cycle enables one operator to handle two machines on most work and assures perfect duplication of size from piece to piece.
- Saves time on lots as small as two or three pieces because total setup never requires more than fifteen minutes, often much less.
- On straight, multiple diameter work, provides accurate size control without tracer being in constant contact with a template. This allows use of micrometer heads, gage blocks or a simplified form of flat template.
- Application does not reduce normal capacity of lathe which may be converted from automatic to manual operation in less than one-half minute.
- Permits the pre-selection and automatic use of as many as five different feeds for maximum cutting efficiency.
- Provides complete electric control from the point most convenient to operator.

For fast, repetitive shaft turning at its economical best, all signs point to the Monarch Motor-Trace. Any standard Monarch Lathe, 14″ to 20″ inclusive, can be factory-equipped with this automatic cycle, electric motor operated, electric tracer-controlled duplicating attachment. And its list of advantages results from 21 years of Monarch leadership in tracer-controlled lathe development.

You'll want full details, photos, performance data and case histories—so you can evaluate for yourself the benefits of Motor-Trace production in your shop. No ad can give it all, but our 12-page illustrated Bulletin #2302 does! We'll send it gladly, or any other information on the full Monarch line which today includes three tracer-controlled duplicating systems. Just indicate your interests. *The Monarch Machine Tool Company, Sidney, Ohio.*

Monarch
TURNING MACHINES
ACCURACY • ECONOMY • LONG LIFE

FOR A GOOD TURN FASTER . . . TURN TO MONARCH

THE MONARCH MACHINE TOOL CO., Sidney, Ohio

Gentlemen: Please send without obligation the following complete Bulletins:

- ☐ Bulletin #2302—The Monarch Motor-Trace
- ☐ Bulletin #2606—The Monarch Air-Gage Tracer
- ☐ Bulletin #2401—Monarch-Keller Controls

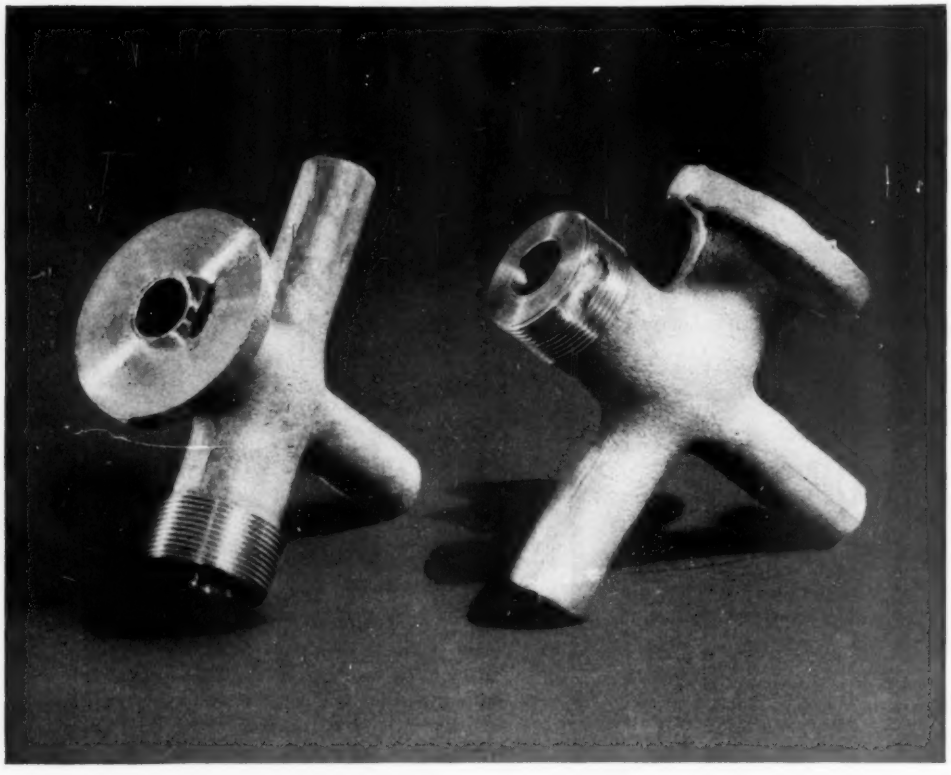
NAME _____ TITLE _____

COMPANY _____

ADDRESS _____

CITY _____ ZONE ____ STATE _____

AN ALIBI WON'T BRING BACK MONEY WASTED MACHINING IMPERFECT CASTINGS!



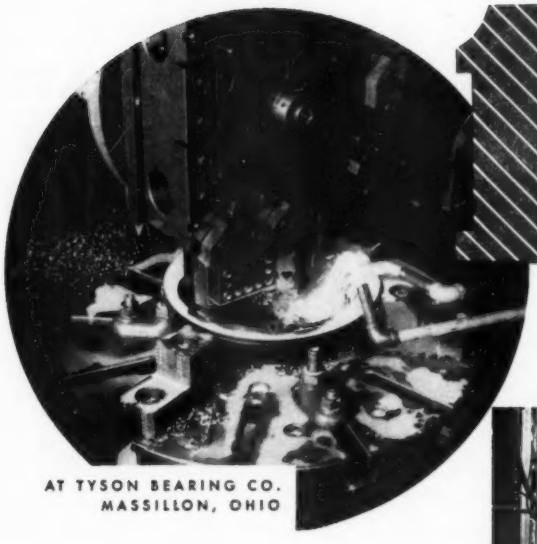
So put your confidence in radiography . . . one of management's surest instruments for cutting cost!

An outstanding example of the contribution of radiography to production processes is revealed by an automobile manufacturer. By pointing the way to improved foundry techniques — radiography is credited with saving this company in excess of a quarter million dollars a year in one part alone.

Another story of savings and profit made possible through the magic of radiography. A double-edge tool that not only diagnoses accurately and authoritatively — but suggests treatment as well.

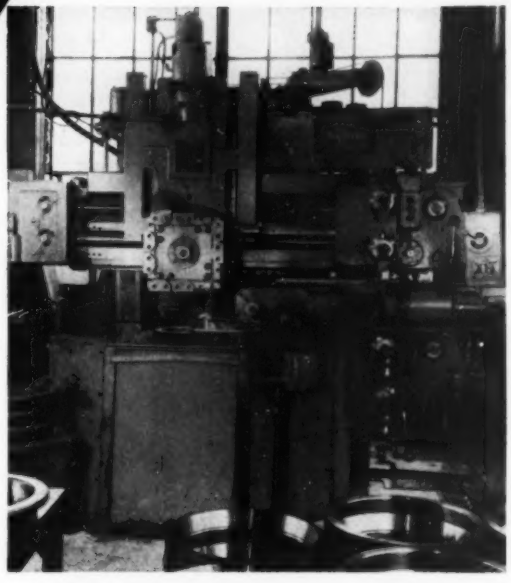
Radiography shows where savings can be made, designs improved, new techniques developed. Write for interesting, informative booklet, "Radiography as a Foundry Tool." General Electric X-Ray Corporation, Dept. AB-2, Milwaukee 14, Wisconsin.

GENERAL ELECTRIC X-RAY CORPORATION



AT TYSON BEARING CO.
MASSILLON, OHIO

1 Replaces 4



ONE MAN-AU-TROL V.T.L. REPLACED FOUR FORMER MACHINES — *for the same class of work . . .*

It handles profitably a variety of comparatively short run jobs.

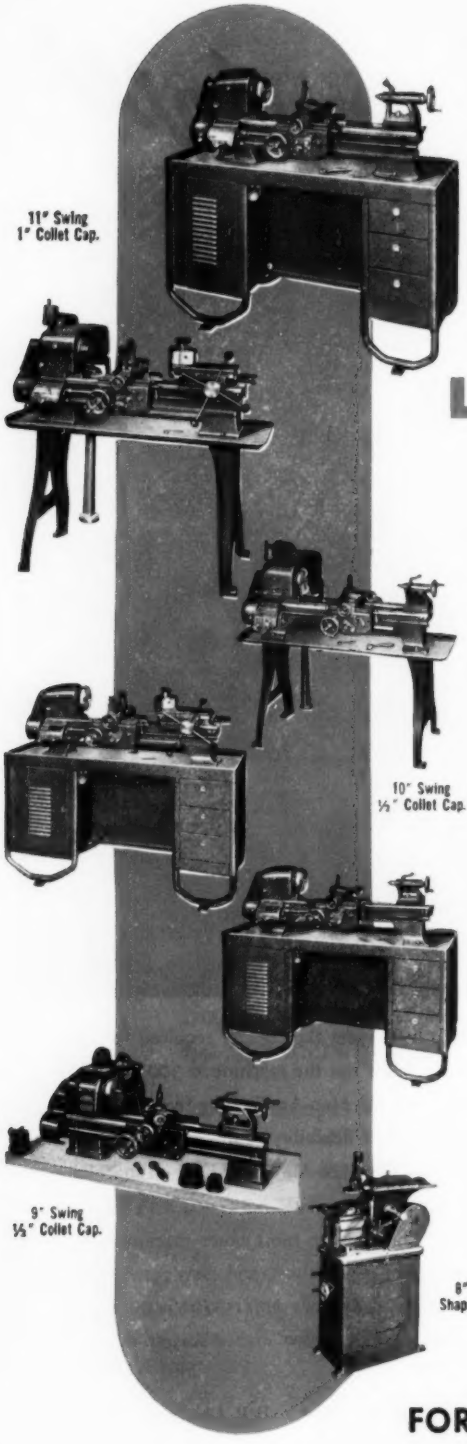
Single cones 10″ to 20″ in diameter, Double cones, Single cups, Double cups, Closing rings and Large cup and cone spacers are the regular run of work.

Man-Au-Trol's rugged design provides the rigidity required for the most efficient use of carbide tooling. Here at Tyson they say, "We run the machine at 300 feet per minute on Krupp steel as against the former 60 feet per minute. On Man-Au-Trol we feed at 1/32″ per rev. and still hold the work and keep it round. We like the great flexibility of this machine."

From the operator we hear — "The Man-Au-Trol is the best machine in the shop. We use it on any work — delicate or big. It cuts anything it can hold — if it's a rugged piece, she sure gets a good bite. It takes no time to get set, less than on most other machines I've worked on. Adjustments are easy and if the machine is set right, she holds sizes and every piece comes out right. There is no fiddling around for a day or two." *This case study proves that replacement of Economically tired machinery is not only basically sound business but also a means towards Improved Earnings.*

THE BULLARD COMPANY

BRIDGEPORT 2, CONNECTICUT



YOU CAN MAKE IT **ACCURATE**

YOU CAN MAKE IT . . . . **FAST**

YOU CAN MAKE IT **FOR LESS**

ON A

LOGAN LATHE

The accuracy inherent in advanced Logan Lathe design permits holding precision tolerances on the production line as well as in the tool room. In large or small shops, wherever the need is for accelerated, accurate parts production and low cost operation, Logan Lathes can provide a practical, profitable solution. 45 accurate, versatile Logan Lathe models, 9″, 10″ and 11″ swing, ½″ and 1″ collet capacity, plus a complete line of lathe accessories assure year-in, year-out dependability. For full details on Logan Lathes and on the Logan 8″ Shaper, see your Logan Lathe dealer, or write to

LOGAN ENGINEERING CO.
4901 West Lawrence Avenue • Chicago 30, Illinois

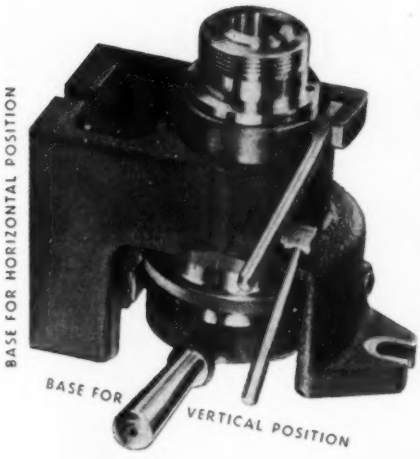
LOOK TO

Logan

FOR *BETTER* LATHES and SHAPERS

HARDINGE HORIZONTAL - VERTICAL

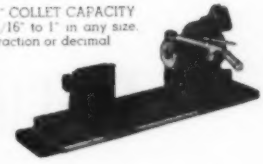
Collet Index Fixtures with Threaded Nose Spindle are fast in operation and hold work accurately



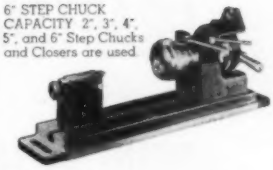
In addition to taking standard collets, this fixture takes step chucks and jaw chucks to cover a wide range of applications. It will eliminate the necessity of your tool room making many specially designed fixtures. Thus, your engineers and tool-makers will have more time for other work.

A preselector arrangement provides the selection of separate indexing of any number divisible into 20 or 24. The collet closer lever has a 100 to 1 leverage for quick opening and closing of collets and step chucks. Write for bulletin.

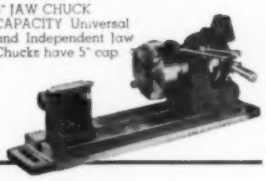
1" COLLET CAPACITY 1/16" to 1" in any size, fraction or decimal



6" STEP CHUCK CAPACITY 2", 3", 4", 5", and 6" Step Chucks and Closers are used



5" JAW CHUCK CAPACITY Universal and Independent Jaw Chucks have 5" cap.



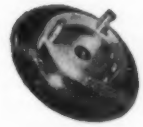
HARDINGE
ELMIRA, N.Y.

HARDINGE-SJOGREN SPEED COLLET CHUCKS

increase production of your lathes and milling machines

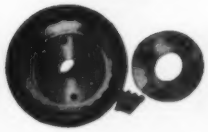
A Hardinge-Sjogren Nose Type Speed Collet Chuck enables you to get full value from your toolroom lathes, engine lathes and milling machines. It gives greater capacity, saves time, increases accuracy and assures better results. An almost effortless turn of the handwheel, one way or the other, automatically opens or closes the collet, releasing or gripping the work as desired. Its grip is adjustable and sure. Production is increased as the operator is always in front of his work. Available in these sizes . . . 1", 1⅜", 1¾", 2¼", or 3½" collet capacity. Write for bulletin.

For CAM-LOCK SPINDLES



For TAPERED KEY DRIVE SPINDLES

For THREADED NOSE SPINDLES



HARDINGE BROTHERS, INC., ELMIRA, N. Y.

SPECIALIZED CRAFTSMANSHIP

MEANS BETTER CASTINGS FOR BETTER PRODUCTS!

Call On

ECLIPSE-PIONEER Foundries

When you order castings from the Eclipse-Pioneer Division Foundries, you *know* they will be right. Your confidence is justified at *every step* in their manufacture, from first planning to final check, for each man is an expert in his field and each operation is backed by more than twenty years experience. But, this craftsmanship is only part of the picture. As a further guarantee of quality, the Eclipse-Pioneer Foundries use the most modern machines, techniques and testing devices obtainable . . . the entire production line is conveyorized to assure rapid and economical service on all orders. Take advantage of these extras. If you plan to use aluminum and magnesium castings, make it a point to consult Eclipse-Pioneer. Meanwhile, send for Eclipse-Pioneer's "Book of Facts".

ALL
Aluminum and Magnesium Alloys
Including the recently developed
Cerium and Zirconium Magnesium Alloys

PLEASE SEND ME THE ECLIPSE-PIONEER "BOOK OF FACTS" ON MAGNESIUM, ALUMINUM AND BRONZE CASTINGS. AM

NAME _____ TITLE _____

COMPANY _____ STREET _____

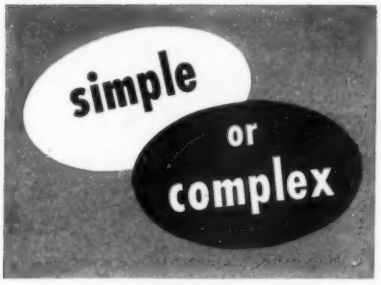
CITY _____ ZONE _____ STATE _____

ECLIPSE-PIONEER DIVISION FOUNDRIES
BENDIX AVIATION CORPORATION
TETERBORO, N. J.

Bendix AVIATION CORPORATION

AND PRECISION (±.005")

PLASTER MOLD CASTINGS



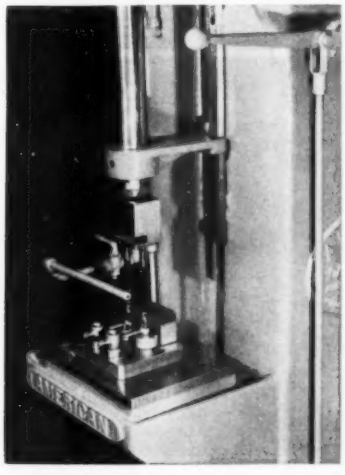
American - ENGINEERED

Broaching Fixtures CUT COSTS

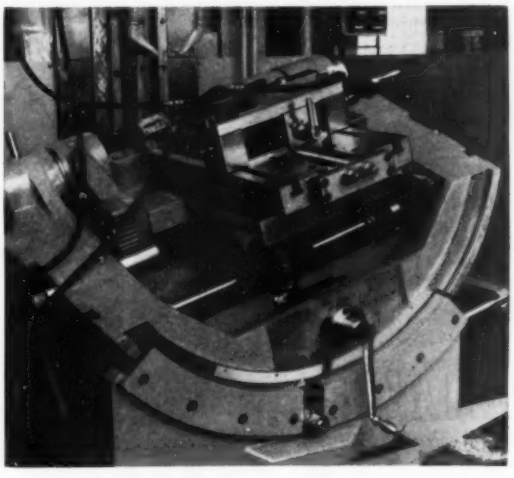
Efficient, economical production is the goal of broaching fixture design. Sometimes this goal is reached best with a simple fixture, designed for complete manual operation. At other times it means a highly complex fixture, engineered for multiple purposes, and equipped for automatic or semi-automatic operation.

The right fixture for your production needs probably lies somewhere between these two extremes. You can be sure of getting the right fixture . . . by having it designed and built by American engineers.

American offers you the advantage of over twenty-five years experience in the design and production of fixtures, broaches and broaching machines. This experience is your assurance of a fixture designed to do your job efficiently and economically. Write for their recommendations. Enclose a part print or sample, hourly requirements and type and model machine to be used. No obligation, of course. Address Dept. A.



This SIMPLE fixture helped one manufacturer cut costs by adapting an American V-1 two ton press to push down broaching of small motor connecting rods. Parts are located from the large hole and swung easily into position. The broaches are arranged to strip back through the work. A plate above the work prevents parts from lifting. An example of how an American-engineered fixture solved a broaching problem.



This COMPLEX fixture permits a milling cutter manufacturer to broach serrations in slots on different sizes of cutters. This versatile fixture permits tilting for helix and conical angles, and adjusting "in and out" as well as laterally to compensate for various sized milling cutters.

Write today for your copy of Catalog No. 450, 32 pages packed with useful, practical broaching information.

American BROACH & MACHINE CO.

A DIVISION OF SUNDSTRAND MACHINE TOOL CO.

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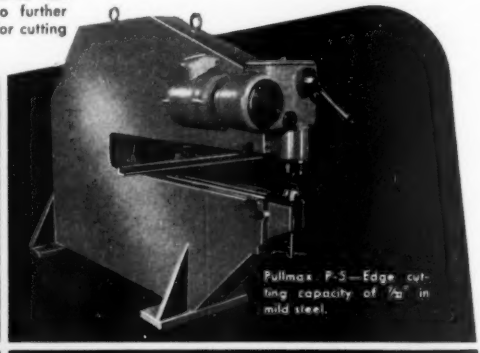
See American First — for the Best in Broaching Tools, Broaching Machines, Special Machinery

PULLMAX THE MOST COMPLETE LINE OF SHEET STEEL AND PLATE WORKING MACHINES

Company after company is discovering the complete versatility of the amazing Pullmax machines. Made in many sizes to fit your requirements.

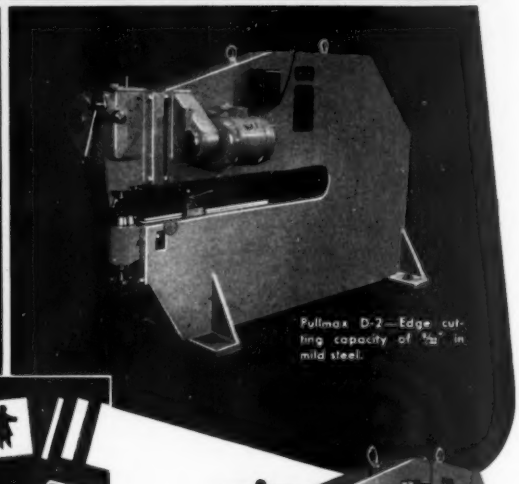
A reciprocating movable upper tool and stationary lower tool provide a smooth perpendicular cut that requires no further finishing. Upper tool can be raised to insert or remove for cutting in center. Cutting capacities listed are for cutting mild steel.

2 Sizes Pullmax AM and AL—Edge cutting capacities of 14 gauge in mild steel.



Pullmax P-5—Edge cutting capacity of 1/2" in mild steel.

2 Sizes Pullmax B-2 and C-2. B-2 has edge cutting capacity of 1/2" in mild steel. C-2 has edge cutting capacity of 7/8" in mild steel.



Pullmax D-2—Edge cutting capacity of 5/8" in mild steel.

PULLMAX DOES:

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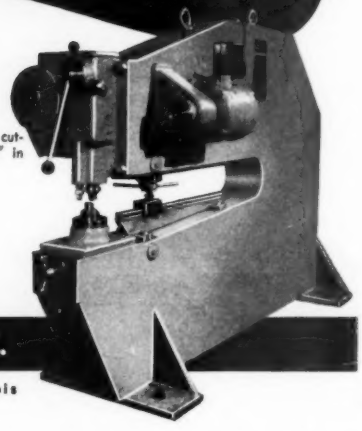
- ★ CIRCLE CUTTING
- ★ INSIDE CUTTING
- ★ IRREGULAR CUTTING
- ★ SLOT CUTTING
- ★ BEADING
- ★ FOLDING
- ★ NIBBLING

7 SIZES OF MACHINES WORK:

MILD STEEL
STAINLESS STEEL
NON FERROUS METAL
WIRE MESH
PLASTIC
and other materials

Pullmax Major—Edge cutting capacity of 1 1/2" in mild steel.



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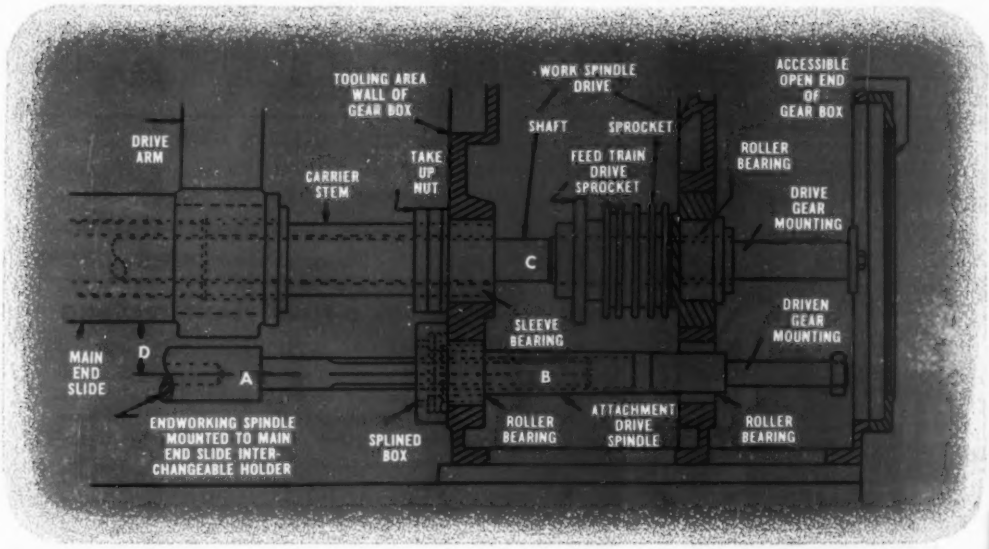


BEWARE OF THE BAR IN BARGAIN

With manufacturing costs much the same the country over, the purchase prices of various brands of a given type of machine tool should be about equal for equal value. Healthy competition tends to level out prices.

All of the best facilities of the highest priced machine may not be needed, and should not be expected of the lowest priced machine. The value of any brand depends on how well its facilities meet the particular needs of the individual plant.

Of all required facilities, those of low-cost operation and maintenance are universally considered important. A machine without them is a BAR to any GAIN at any PRICE.

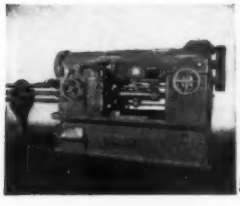
An example of **LOW-COST OPERATION AND MAINTENANCE FACILITY** is the **EXCLUSIVE** Conomatic **"ALL POSITION" END ATTACHMENT**, which has:

1. **Direct Drive to ANY Rotating Tool, in ANY or ALL SIX, Main End Slide Positions. Solid Tapping in ANY THREE Positions on ONE Set-up. Die Head Swing, D, clears COLLET CAPACITY in ANY Position.**

The above drawing shows Endworking Spindle, A, in a Main End Slide Position of a 1½" SIX SPINDLE Conomatic. Its splined shaft is rotated by the Attachment Drive Spindle, B. The drive from the Work Spindle Drive Shaft, C, is indicated. The Spindle, A, rotates in its bearing in an interchangeable Holder mounted to the Main End Slide, whose travel it may take. Three levers and cams offer independent travel to any three Endworking Spindles per single set-up.

2. **Accessible OPEN-END Application and INTERCHANGEABLE Attachment HOLDERS. Selective Speeds and Feeds.**

Six Attachment Drive Spindles may be applied to one set-up. Two are machine equipment. There is drive facility for 168 Speeds between 132 and 6158 RPM for drilling, boring, etc. Std. Drive Gears offer 10 Threading Speed Ratios.



Buyer's Comparison Chart will guide you to full information

A Comparison of ALL Automatics is in Favor of Cone

Conomatic

CONE AUTOMATIC MACHINE COMPANY, INC.
WINDSOR, VT., U.S.A.

Hole Location Practices

Published in the interests of greater accuracy and quality in the toolroom and on the production line by the Moore Special Tool Company, Inc., 738 Union Avenue, Bridgeport 7, Conn., builders of Jig Borers, Jig Grinders, Panto-Crush Wheel Dressers, Die Flippers, Motorized Centers and a complete line of Hole Location Accessories.

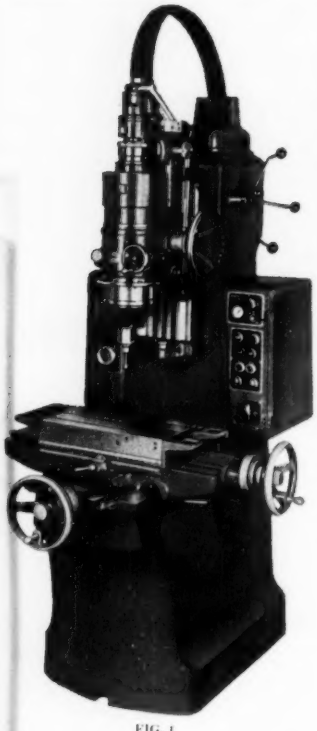


FIG. 1

Now...Jig-Ground Contours

When first conceived by Moore 12 years ago, the Jig Grinder was designed primarily to position accurately and grind cylindrical as well as conical holes, with taper in either direction. Continuing development and user-experience have since revealed a wider scope of applications, particularly in grinding contours. Result: a completely redesigned and larger Moore Jig Grinder (Fig. 1) that contour grinds, chop grinds and slot grinds as easily as it hole grinds.

Press tools such as lamination and similar dies have various combinations of radii, tangents, angles, and flats, all of which must be accurately ground to size and location. The ordinary lamination die, shown in

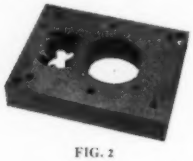


FIG. 2

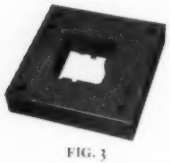


FIG. 3

Fig. 2, is an excellent example. The two-station section was ground complete with proper draft in only 25 hours. Previous time, including filing, stoning and template work, was 80 hours.

Every contour and surface was also checked in the Jig Grinder by coordinate measurement with the lead screws, an important feature of Moore Jig Grinders and Jig Borers.

The right side of the blank die (Fig. 3) was ground with the regular grinding head. The corners, slots and projections on the remaining three sides were done with the new slot-grinding attachment (Fig. 4). Proper draft (including corners) was ground around the entire contour with the taper-setting attachment.

Ask for a free reprint of an eight-page article on the design of the No. 2 Moore Jig Grinder which appeared recently in MACHINE DESIGN.

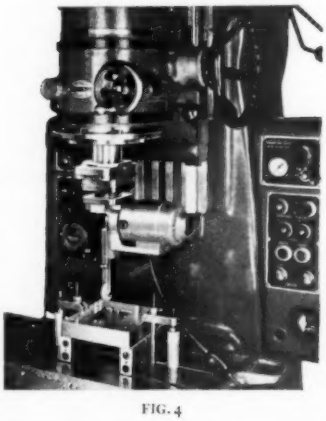
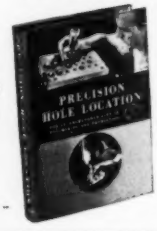
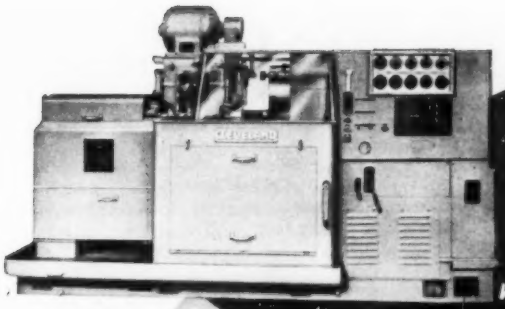


FIG. 4

VALUABLE BOOK FOR DEFENSE PLANT TRAINING



PRECISION HOLE LOCATION contains many examples of jig-boring and jig-grinding practices similar to one described here. 448 pages, 400 illustrations. Over 7500 copies of this authoritative book have been sold to date. 184 pages of Woodworth Co-ordinate Location Tables from 3 to 100 holes. Available at special price of $3 in U.S.A., $3.50 elsewhere. Send check or money order to Moore Special Tool Co., Inc., Bridgeport, Conn.



all kinds of parts . . . from a variety of materials . . . fast, accurate, at low cost

with the new DIALMATIC CLEVELAND

Model AB 2½" Single Spindle Automatic

ADJUSTING SCREW Close tolerances. From SAE 5120 hot rolled steel.

ALUMINUM CAMERA PART Exceptionally good finish and close tolerances held.

GEAR BLANK High production part from SAE 1050 cold rolled steel.

SPOOL Formed from free machining brass.

REDUCING BUSHING From SAE 1112 cold rolled steel. Commercial thread tolerances closely held.

SHOULDER BEARING From free machining brass. Fine finish important.

DIE CASTING INSERT Requires exceptionally good finish. From SAE 1112 cold rolled steel.

SHOWN here are a few samples of *profitable* production being turned out by prominent, cost-conscious manufacturers on new Dialmatic Clevelands.

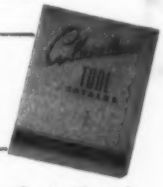
The Model AB Dialmatic Cleveland is fast and accurate, rigid and powerful. Just consider this: Here, in one machine having a 2½" bar capacity, is a spindle speed range that permits you to thread 2½" diam. alloy steel down as low as 16 sfm—or work ⅞" free machining brass at 416 sfm! 112 spindle speed selections are available.

And set-up time is *short! Electric Feed Drive* operates all five turret tools (a 6-hole turret is supplied when required). Forward and return turret tool feeds are simply set by positioning dials on the control panel. Double cross slides operate by standard cams mounted on adjustable drums.

More versatile than any other automatic, the Model AB Cleveland is quickly and easily *converted to a chucker*—ideal for shops having an occasional chucking job to run in addition to their bar work.

Why don't *you* find out *now* if the new Dialmatic Cleveland can cut the cost of your production? Ask Camco engineers to submit a direct proposal with production estimates on your work. For complete machine specifications, write for bulletins.

The Cleveland Automatic Machine Co. manufactures and stocks a complete line of STANDARD TOOLING and COLLETS for use with Cleveland Automatics. Prompt deliveries. Write for complete information.



Remember, *Clevelands Cut Costs*

THE CLEVELAND AUTOMATIC MACHINE COMPANY

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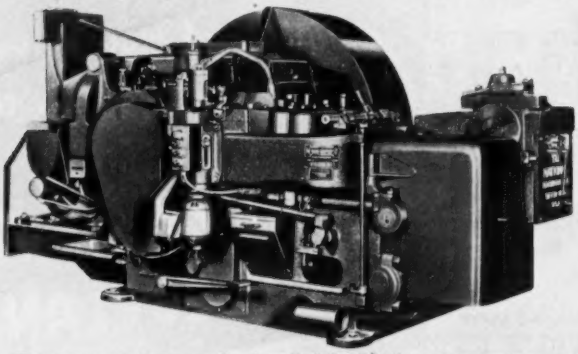
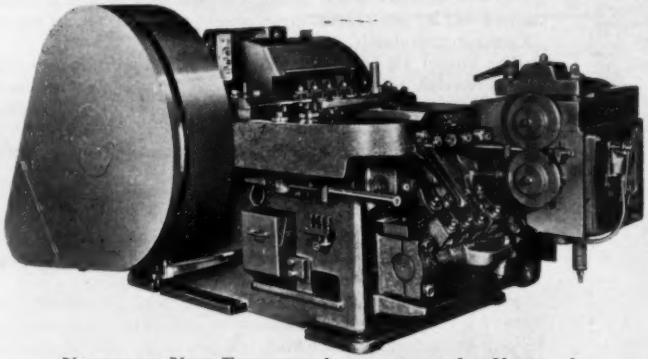


The American Fastener Industry shipped 1,000,000 tons of fasteners in 1950 . . . more than in any previous year.

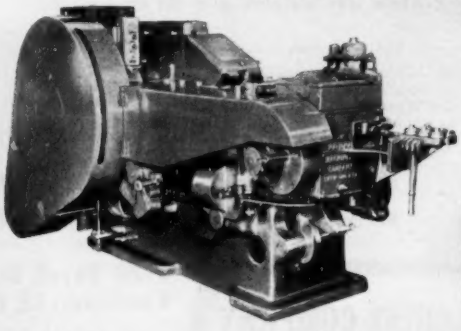
NATIONAL is proud of the part that the methods and machines which it has engineered and developed, have played in this accomplishment.

BOLTMAKERS are producing finished bolts, cap screws, and a variety of other work, by combining extrusion, upsetting, trimming, pointing, and thread rolling—all on one machine!



NATIONAL NUT FORMERS incorporate the National-developed method of cold-forging nut blanks. These machines are recognized for their ability to produce blanks of outstanding quality at high efficiencies.

NATIONAL HIGH SPEED PRECISION NUT TAPPERS automatically tap nuts to close fits. Operating advantages include new high speeds, unexcelled accuracy, long tap life, quick tap change, and built-in safety devices.



Rugged, dependable NATIONAL COLD HEADERS are producing a wide variety of work to dial-indicator exactness at high speeds. Machines feature ease of set-up and low-maintenance cost.

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TIFFIN, OHIO.

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P&J Tooling Specialists can help you tool up to speed up the precision-production of duplicate parts. They know best how to group and combine multiple operations — how to engineer secondary operations into a main setup — how to eliminate all unnecessary work handling.

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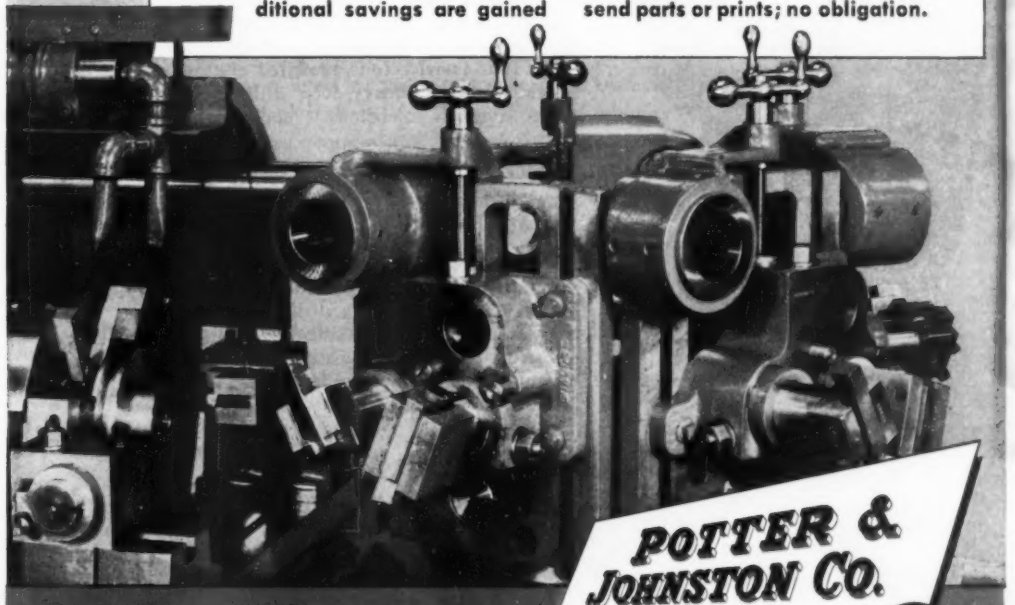
In countless instances, modern quality control inspection methods are demonstrating the ability of precision-built P&J Automatics to perform the most exacting operations to close tolerance standards—to turn out better work—and more of it—with fewer rejects—at lower cost-per-piece.

DO IT WITH P&J TOOLING ON POTTER & JOHNSTON AUTOMATICS

P&J Automatics come in a wide range of models and capacities for the production-machining of anything from a few ounces to several hundred pounds. They'll give you maximum economy in tooling and production costs. Additional savings are gained from the divided labor costs of one man's operation of 2 or more Machines.

P&J Tooling Specialists will work out tooling recommendations and time estimates to demonstrate P&J economy on your work. Simply send parts or prints; no obligation.



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A saw — any saw — can be only as good as the steel and the workmanship that go into it! And that's why ATKINS saws are so outstanding . . . because they are made of the finest, toughest steel ever formulated for the purpose! . . . and because ATKINS, through many years of research and *learning by doing*, has acquired the "know how" to produce cutting tools that stay sharp longer, that cut faster, that greatly reduce maintenance and operating costs!

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the finest are "Silver Steel" saws

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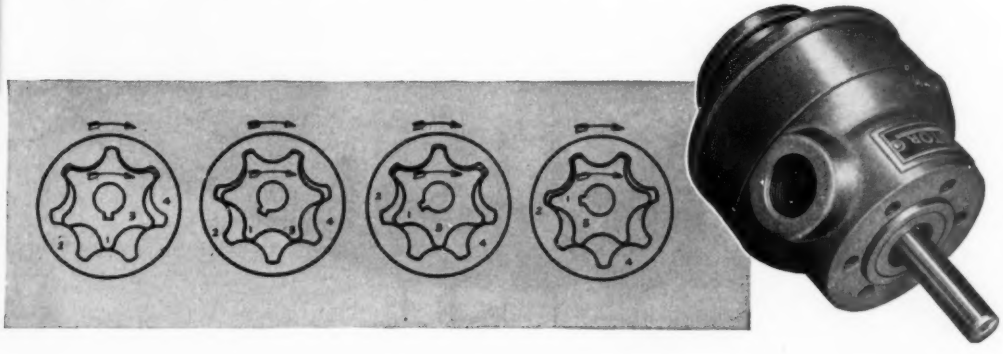

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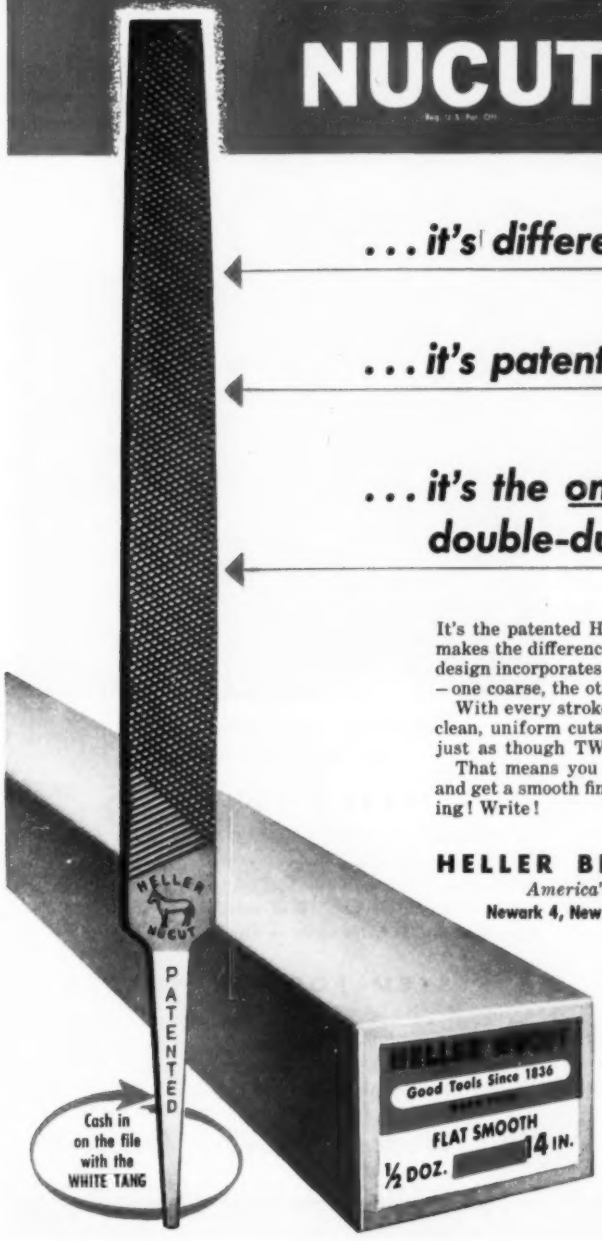

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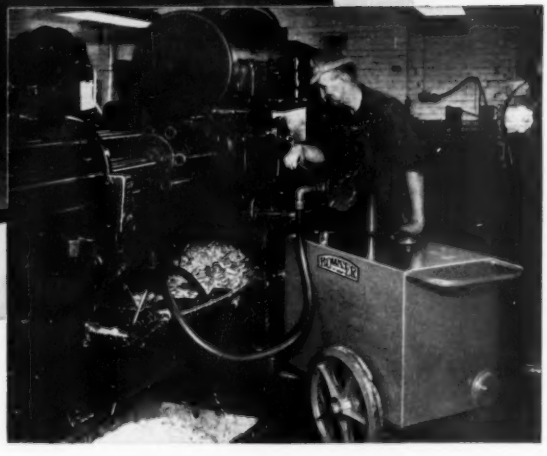
RECLAIM YOUR CUTTING OILS!

Pumping filtered oil into wheel tank



Removing used cutting oil from machine sump

This Bowser cutting oil reclamation system removes all fine chips, sludge and skin-infecting bacteria by a combination of heat sterilization, precipitation and filtration. It also provides storage for both dirty and reclaimed cutting oil.

Hundreds of metalworking plants are using this equipment and operating it continuously to reclaim the dirty oil extracted from chips as well as oils removed from machine sumps.

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In oil savings alone this Bowser system usually pays for its investment in only a few months. The *extra production dividends* you get are longer tool life, freedom from workers' skin infections and better housekeeping. It helps to solve disposal problems, too.

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For those cutting operations requiring full, continuous filtration on either individual machines or large groups . . . there's a Bowser cutting oil or coolant filter ideally suited for the job.

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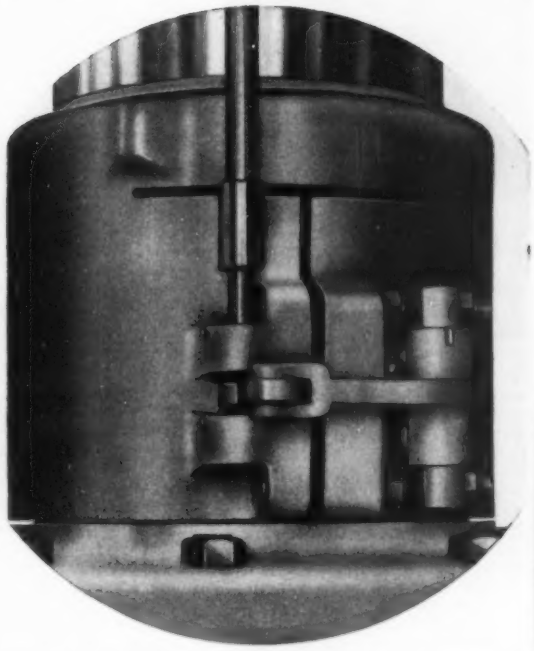
PIONEERS IN INDUSTRIAL OIL RECLAMATION

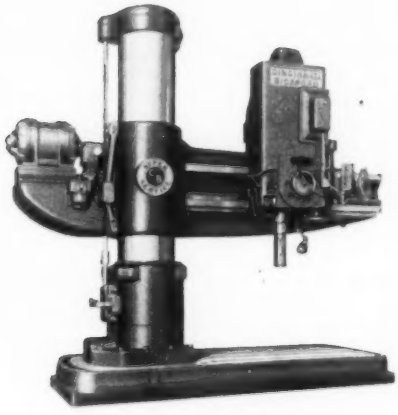
TRIED *and* TRUE

Now, powerful hydraulic arm and column clamping, operated by push buttons at the head, is standard, available on ALL Super Service Radials having column diameters from 11" to 26", inclusive.

This new feature on the smaller radial drills has been applied after many years of development plus 10 years of use on the large 22" and 26" diameter column machines which necessitate the most effective and powerful clamping that can be devised.

Step saving controls, all centralized on the SUPER SERVICE "clearview" head decrease machine handling time and increase accuracy and production.





Equal Efficiency of Every Unit Makes the Balanced Machine

Column clamping mechanisms are many and varied in design, but no other assures maximum power and effectiveness by providing;

1. The double draw bolt acting on hardened eccentrics.
2. Simple trouble proof hydaulically actuated clamp.
3. Push button controlled at the head on all of the SUPER SERVICE radial drills from the 11" diameter column to the 26" diameter column machines inclusive.
4. Uninterrupted column sleeve clamping surface is an integral part of the column sleeve, permitting stronger sleeve construction.
5. Stress proof column sleeve clamping area.
6. Less movement to the arm when clamp is actuated.

For further information on the distinctly superior engineering features of the SUPER SERVICE radial, write for booklet R-29 covering the 11" to 19" diameter column machines, and Booklet R-22 on the 22" and 26" diameter column machines.

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for

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- POINTING
- BURRING

Cross Universal Gear Machines embody advanced engineering developments to obtain highest productivity and assure lowest possible operating costs.

They feature utmost flexibility for handling a wide variety of gears. Continuous cutting motion, exclusive with Cross, speeds production at top efficiency.

Special skill is not required because machines are automatic and push button controlled. Power clamping is foot pedal controlled. Both hands are free for work handling.

No. 55

For rounding, pointing, chamfering or burring external and internal:

spur gears
helical gears
clutches
splines

Typical productivity when rounding or pointing 8 pitch 30 tooth gears is 55 net hourly.

No. 65

For pointing or chamfering external and internal:

clutches
spur gears
bevel gears
splines

Typical productivity when pointing 10 pitch 30 tooth gears is 100 net hourly.

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For burring or chamfering both ends at the same time.

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spiral bevel pinions
hypoid pinions

Typical productivity when chamfering 8 pitch 40 tooth gears is 200 net hourly.

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Established 1898
SPECIAL MACHINE TOOLS
MILLING • DRILLING • TAPPING • BORING
TURNING • SHAPING • GRINDING • HONING
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Backlash

EXTRACTS FROM CURRENT LETTERS TO THE EDITORS

High-Speed Turning

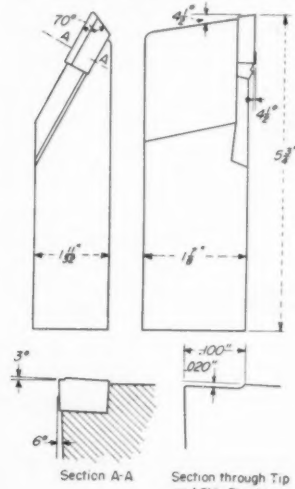
I have read with great interest and no little wonderment the sfpm figures quoted in your article published in the English "Machinist," Dec. 9 (*AM*, Mar. 9, 1950), entitled "Are Shop Men Scared of High-Speed Machining?"

I note the article deals with super high speeds in terms of milling operations, and the fundamental question I would put to you if I may is: Is it possible to apply these speeds to turning operations to get production and economical tool life using commercial carbides? If not, then the rest of this letter will be of purely academic interest.

Taking up what seemed to me to be almost a challenge in your article, I have carried out the following test, running at what is, relatively speaking, a super high speed:

The machine used was a George Fischer copying lathe, max. cap. 14 in. dia and 100 in. between centers, 23 hp. Material was EN 9 (0.5-0.6 C, 0.05-0.35 Si, 0.5-0.8 Mn). Test piece: 5 in. dia x 26 in. long. Normal cutting speed for this material 450 fpm. Normal feed 0.020 ipr, ⅜ in. depth of cut.

Test cutting speed: 1500 fpm; depth of cut 3/16 in.; feed 0.010 ipr. Dry cutting conditions were used. The tool was tipped with a carbide we have found to be most suitable for this material and was ground and lapped to the angles and with a chip breaker as shown in the accompanying sketches. The whole area of tip-making contact with the work and chip was hand-lapped finally to a mirror finish and a fine "white line" was lapped along the cutting edge. (Hand lapping was a luxury which could not normally be indulged.)



Section A-A — Section through Tip and Chip Breaker

The tool cut satisfactorily for approximately ¾ in. along the test piece, then rapid wear took place and the part of the tip in contact just wore away.

I should like to submit that unless there is something fundamentally wrong with our tool shape that it is not practicable to use these high speeds for turning.

My conclusions from this and numerous other carbide-cutting tests, where speeds have been nearer normal, are that at the very high temperatures and with the terrific abrasive action which occurs at the cutting edge, the bond of the carbide tip simply fails and from the initial minute failure, further failure is extremely rapid.

I should welcome your criticism of the above, along with any information you may feel inclined to pass on for my future guidance.

John A. Pitt
Planning & Time Study Engineer
James Archdale & Co., Ltd.
Worcester, England

Here are a careful test and a sound question. Basically, Mr. Pitt's tool shape seems proper, but we feel that a flood of coolant should have been provided. Apparently, tool-tip temperature goes so high, the carbide breaks down. His normal turning speed is actually fairly high, and the test speed very high. We have suggested changes, but do readers have further suggestions?—E.J.T.

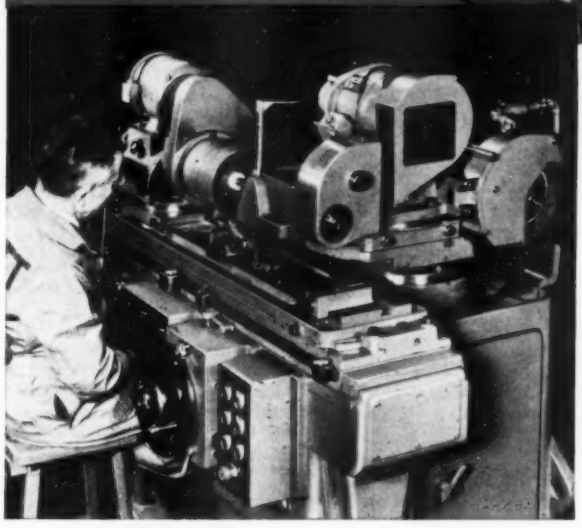
Idea Isn't New!

We should like to call your attention to an article in Practical Ideas (*AM* Dec 25 '50, p 118) titled "Cupped Nut Distributes Coolant in Wheel." We appreciate that your staff could

A great tool-room achievement!

TURNING to GRINDING

with *No Change* in chucking....



Collets, chucks, and all spindle nose attachments are interchangeable between the Rivett 1020S Lathe and 1024 Universal Grinder. By moving the whole mounting you really save time and gain far greater accuracy. And on these two famous Rivett machines you can handle two-thirds of the jobs in an average tool room—*all* internal, external, shoulder, and face grinding: *all* turning, boring, facing, and threading. For the 1024 Grinder is truly universal with a 180° swiveling double-end wheelhead: and the 1020S Lathe combines the precision of an instrument lathe and the ruggedness of an engine lathe.

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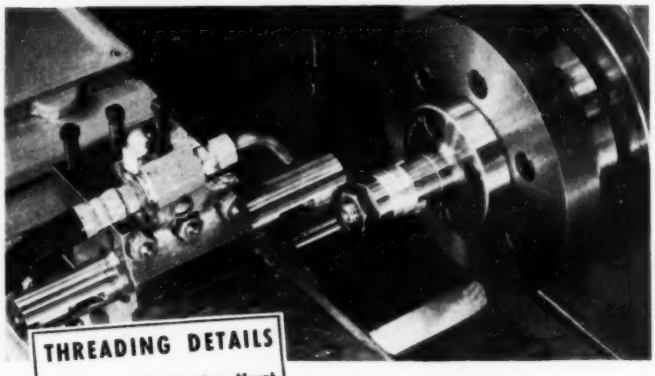
Focusing Lens Mount

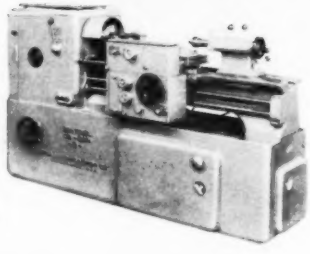
11-START THREADS
produced in
9 SECONDS per THREAD!

EASTMAN KODAK COMPANY threads focusing lens mount speedily and economically with the Cri-Dan High Speed, Semi-Automatic Threading Machine.



THREADING DETAILS

Part	—Focusing Lens Mount
Material	—Aluminum Alloy
Thread	—11-start 32P LH
Length of Thread	—External ¼" Internal ½"
No. passes	—10
RPM	—550
Threading Time	—9 seconds per thread



IF YOU DO THREADING up to 4" external—6" internal, investigate the Cri-Dan Threading Machine.

Contact your Lees-Bradner representative.

The LEES-BRADNER Company
CLEVELAND 11, OHIO, U.S.A.

not possibly be expected to separate all of the "new ideas" from those which are already patented and in use, but perhaps you won't mind our calling this instance to your attention.

Your article describes a system which is covered by our US Patent 2,470,350. In England, the George H. Alexander Machinery Co., Ltd., has been licensed by us to produce equipment covered by this patent. This "cool grinding" equipment has been produced by the DoAll Company for about three years.

In view of the above, we think you may be willing to direct to us any requests for information which you may receive as a result of this article, and possibly give us a little space in a forthcoming issue to mention the fact that DoAll is way ahead of your correspondent from Holmsley, England, when it comes to "cool grinding."

H. W. Pottle
Asst. Sales Mgr.,
The DoAll Company

Drawing Pressures

Do you have any more information on how to calculate drawing pressures (*AM*—Oct. 30, p94), especially for irregular shells?

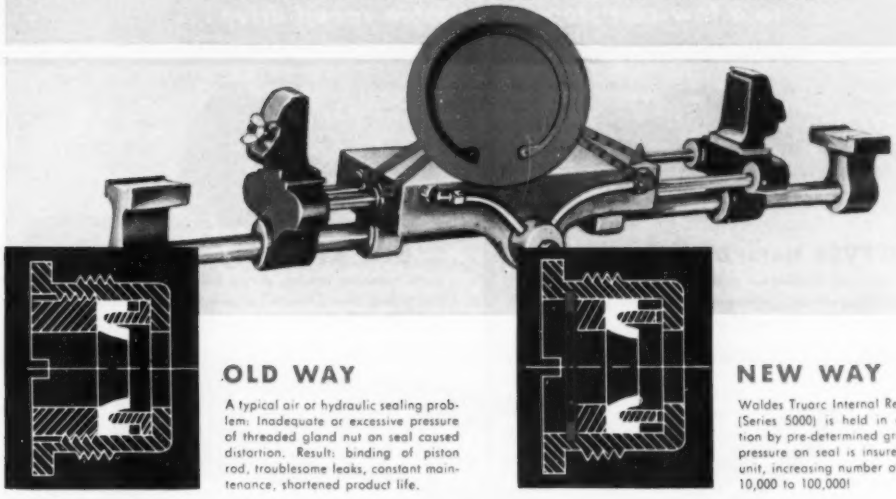
Lawrence Vigus
Tool Engineering, Plant 2
Frigidaire Div., General Motors

I am sorry to disappoint Mr. Vigus but there is little information that I can add to the above article. The data given are commonly known to European tool engineers, and I supplied them to American Machinist *after a study of existing American texts showed no references. My chief source was Giuseppe Colombo's "Manual dell' Ingegnere, p. 892, 70th ed., 1939. This is the most important engineering handbook used in Italy, where I studied, and compares favorably with the "Hutte" work published in Germany.*

As for drawing irregular shells, there is my reference to the subject in the above source. The data supplied in the arcticle come from my personal experience.

Federico Strasser
Santiago de Chile

4 TRUARC RINGS CUT ASSEMBLY TIME 40%
CUT UNIT COST 25%
PROLONG PRODUCT LIFE 9 YEARS



OLD WAY

A typical air or hydraulic sealing problem: Inadequate or excessive pressure of threaded gland nut on seal caused distortion. Result: binding of piston rod, troublesome leaks, constant maintenance, shortened product life.

NEW WAY

Waldes Truarc Internal Retaining Ring (Series 5000) is held in correct position by pre-determined groove. Proper pressure on seal is insured for life of unit, increasing number of cycles from 10,000 to 100,000!

Using 4 Waldes Truarc Retaining Rings in their Check-N-Spect Air Power Units (for tire inspection and repair) saves Bowes Seal Fast Corp., Indianapolis, 40% in assembly time, 25% in cost. With Waldes Truarc Rings, assembly is simple... maintenance unnecessary. New design increases unit life from 1 to 10 years!

Redesign with Truarc Rings and you too will cut costs. Wherever you use machined shoulders, bolts, snap rings, cotter pins, there's a Waldes Truarc Retaining Ring designed to do a better job of holding parts together.

Truarc Rings are precision-engineered... quick and easy to assemble and disassemble. Always circular to give a never-failing grip. They can be used over and over again.

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Waldes Truarc Retaining Rings are available for immediate delivery from stock, from leading ball bearing distributors throughout the country.

REDESIGN WITH 4 WALDES TRUARC RETAINING RINGS BRINGS THESE BIG SAVINGS...

• Eliminates skilled-labor milling and threading operations	
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• Saves 40% in assembly time	$.09
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• Less Cost of four Waldes Truarc Rings	.08
• Net savings on parts	.16
TOTAL UNIT SAVING...	**$.25**

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TRUARC

REG. U. S. PAT. OFF.

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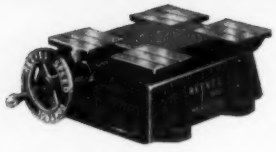
converts any standard constant speed motor to a low-cost stepless variable speed drive . . .



1. REEVES Motor Base provides sliding platform for motor. Handwheel or push-button control increases transmitted speed by moving motor toward driven machine, decreases speed by reversing the operation.

2. Disc Assembly connects directly to motor shaft. Assembly consists of two facing cone-shaped discs—one sliding laterally—and compression spring for mounting as a single unit on motor extension shaft.

3. Special V-Belt hooks up unit with driven machine. Belt fits between discs and over pulley on power input shaft of driven machine. Belt is adjusted to minimum center.

Result: INFINITELY VARIABLE SPEED WITHIN 4:1 RATIO

Unit instantly delivers any desired speed over entire range and maintains that speed without fluctuating even a fraction of an rpm.

The REEVES Vari-Speed Motor Pulley is the easiest, lowest-cost method of converting a machine with fixed speeds into a highly versatile unit of infinitely variable speed adjustability. Thus equipped, it can handle a wider range of work, better, faster and more economically, because machine speed can be changed instantly and accurately—without shutdowns—to meet the needs of every operation and every operator, *under every changing condition.*

This REEVES unit forms the actual driving element between motor and driven shaft . . . eliminates all auxiliary equipment such as chain drives, gears, belts, etc. . . . requires virtually no more space for installation than any standard belt or chain drive. It is built in eleven sizes, transmitting from ⅛ to 10 hp., over speed ratios from 2¼:1 to 4:1, inclusive.

The complete line of REEVES Speed Control equipment also includes two other basic units, the Variable Speed Transmission and the Vari-Speed Motodrive, which are offered in the widest selection of designs, sizes, capacities and speed ratios—handwheel, push-button or entirely automatic controls.

REEVES units have proved their ability to speed production, cut cost and increase profit in more than 300,000 widely diversified industrial applications . . . are listed as standard equipment on over 2,100 different makes of modern machines.

An experienced REEVES Speed Control specialist will be glad to work with you in selecting the units best suited to your needs. Write today, arranging an interview, and ask for Catalog A7a-G509.

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Recognized Leader in the Specialized Field of Speed Control Engineering

ACCURATE • VARIABLE

Reeves Speed Control

GIVES THE RIGHT SPEED FOR EVERY JOB!

SPOT NEWS of Metalworking

- **Buick is reported to have signed contract to make Sapphire (British) jet engine** in new plant at undisclosed location. As many as 1500 machine tools may be needed for this job.

- **A new material, primarily of aluminum oxide, has been developed** as an alloy in making cutting tools to machine super-hard metals and for applications involving high temperatures necessary to melt super-hard metals. Another possibility is mixing metal and ceramics for use in jet aircraft parts such as turbine blades. Development is at Wright-Patterson Air Force Base Research Laboratory. Aluminum oxide is formed into non-porous crucibles having compressive strength of 500,000 psi which is retained up to temperatures of 2000 F.

- **Real manpower controls are not in sight before end of year.** Job freezes, manpower ceilings, compulsory 48-hr week and the like won't be applied until then. Meanwhile, you'll be asked to cooperate in voluntary measures to alleviate manpower shortages.

- **Wage Stabilization Board eventually will take on disputes as well as wage controls** as part of its duties, thus becoming another War Labor Board. This will happen when disputes become a major defense problem. Possible sore spots: automobile (if WSB tampers with wage escalator clauses), electrical and shipbuilding industries. A no-strike pledge is not in sight. If and when it comes, it may be limited to defense production workers.

---

22 defense prime contractors will display parts and subassemblies for which subcontractors are needed Feb. 19-23 at Air Force Procurement Office at 67 Broad Street, New York. Invitations have gone out to subcontractors to view display (see Subcontracting News, a new department beginning on p 231 for details on this event and for other news of interest to subcontractors).

- **Roller slitting knives are being made from tungsten carbide** for cutting abrasive cloth strips. Design is unique in that knives are "self-sharpening" as they slit the abrasive material with abrasive side in contact with knife roller.

- **Four-engined turboprop sweptwing Douglas 1211-J** is contender for Air Force order for long-range bomber to succeed present B-36. It has gross takeoff weight of 322,000 lb, normal absolute range of 11,000 nautical miles, combat altitude of over 55,000 ft, speed above 450 miles. Plane is equipped with electronic gear for locating ground targets and for long-range detection of enemy interceptor planes and missiles.

Design simplification to save metal is "in the works." NPA will order it first in builders' hardware, then for other lines. It will require brass plate on steel, for example, in place of solid copper.

- **W. F. & John Barnes Co. has been awarded contract** for $3 million to reopen and operate Rockford, Ill., shell plant of Ordnance Corps of Army. Hoosier and Indiana ordnance plants at Charlestown, Ind., also will reopened by Ordnance.

- **New approach to problem of recruiting workers:** Le Roi Co., Cleveland, held open house Sunday, Feb. 4, for prospective employees to see shop in which they might work. Skilled workers and supervisors were on hand to explain how rock drills are made, what they are used for. Cut-away models of products were on display.

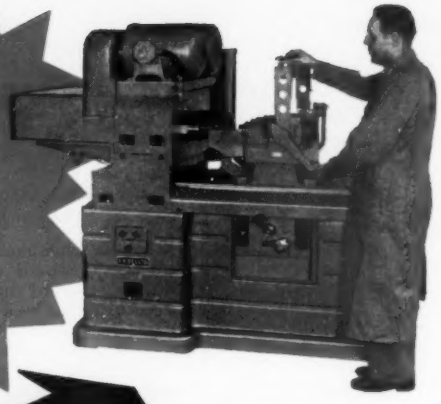
- **Chrysler has developed a brand-new tank engine** which will be produced in the government plant near New Orleans, La., used by Higgins during World War II for shipbuilding.

- **Push-button-operated chucks and electric torque wrenches** for tightening scroll chucks are contributing to greater machining accuracy. Operators cannot distort work by improper clamping.

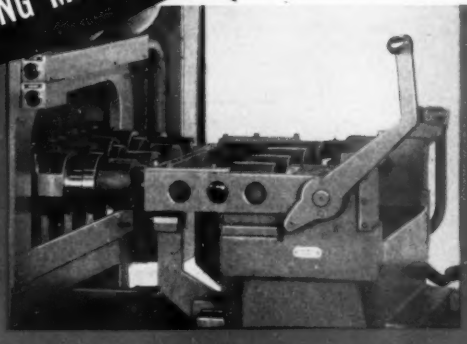
- **Essential exports (including metalworking products)** will be decided by new Washington committee headed by ECA Administrator William Foster. Materials allocations will back up exports essential to the defense effort. Committee probably will grow into centralized claimant agency for all needs for our allies, like wartime Foreign Economic Administration.

8 SURFACES MACHINED ...1046 PIECES PER HOUR...

...ON EX-CELL-O PRECISION BORING MACHINE



Operator placing pistons on loading pins. Movement of the loading lever controls the automatic machine cycle.



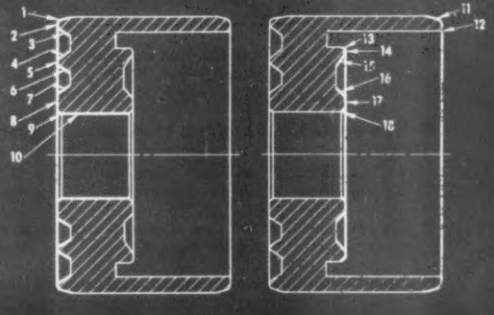
Here the loading bracket has been turned down toward the spindles. Further movement of the loading lever seats parts in the chucks.

Two Style 112-C Ex-Cell-O Precision Boring Machines finish eighteen surfaces of the parts shown in the drawings at right below. One machine finishes 8 surfaces at the net rate of 1046 pieces per hour; the companion machine finishes 10 surfaces at the net rate of 640 pieces per hour. The parts are automotive shock absorber pistons, approximately one inch in diameter.

The spindles, four on each machine, operate continuously. Work loading equipment and automatic ejection of finished parts contribute to the extremely fast machine cycles.

Whether your work involves precision machining in large volume or in small lots you'll find that it's economical to use *standard machines* whenever possible. Ask your Ex-Cell-O representative for complete information on standard Ex-Cell-O Precision Boring Machines.

These enlarged drawings show in heavy lines the surfaces finished on the two Ex-Cell-O Precision Boring Machines. One machine finishes the surfaces numbered 1-10; the other 11-18.



XLO

EX-CELL-O for PRECISION

30-20

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Washington

Materials controls are giving industry a new look—the garrison state look. We get that way by converting some industries, cutting back some, shutting down others entirely. There'll be a lot of this sort of thing by year's end.

The big shift will come by July 1. That's when the New Controlled Materials Plan starts. Under CMP, the government will channel all copper, steel, aluminum into two categories of production: an "A" list of military and allied items a "B" list of essential civilian needs and common industrial components—nuts, bolts, machinery, etc.

• • •

A tentative "B" list has been set up. It's by industries—the only ones that will get metal under CMP. Others may be added, but the core includes vital civilian services (transportation, communications, other utilities, hospitals, schools), farming and food processing, defense housing, components for these and the military production.

Expansion of basic materials comes next. It heads the "temporary" portion of the "B" list. Allocations for new plant will continue until we are getting enough steel, copper, other critical materials we can produce domestically. No one knows yet what will be "enough."

• • •

There'll be more consumer hard goods, too—for a while, anyhow. Some automobiles, radio and TV, other appliance production will be permitted under CMP. The rate will be cut—say 20-30% below 1950 levels. And new models probably will be banned to save tool metal.

Consumer goods will be cut first when more metal is needed for the military and top "B" list production. But these demands simply won't take that much metal this year, the mobilizers say.

• • •

Materials controls until July 1 will continue the build-up for CMP. Plants will have to start making "A" or "B" list supplies or get along without critical materials. For the plant that can't, it means: find substitute materials or close down.

That's the meaning of recent materials cutbacks. The copper and aluminum orders, for example, banned use of those metals in gadgets, many construction supplies and trim. They'll upend thousands of metal fabricators—makers of venetian blinds, ash trays, etc.

• • •

The squeeze is tightest on smalls, the little producers who have no defense contracts and little hope of getting any. Their plight was bemoaned by the Senate Small Business Committee. But Congress has no serious plan of relief.

Steel cutbacks are next. National Production Authority has decided it can't wait until July to limit use of scarce alloy steels. Latest pinch is from military demands for armor-plate and high-temperature tubing.

• • •

Congress won't swallow pay-as-you-go taxes. The first, $10-billion portion of the administration program to raise $16.5-billion of new money staggered the lawmakers. That means the Treasury will have to borrow to meet the mobilization costs.

Heavier and more excises are certain—that's one thing you can be sure of in new taxes this year. They'll approach the proportions of a general sales tax on all "non-essentials."

• • •

More strategic materials from abroad should come soon out of a new ECA policy. ECA will finance all costs of development projects, instead of just dollar costs. This will include labor, the big hitch heretofore in foreign projects.

• • •

Taft-Hartley may be revised to eliminate conflict with wartime disputes settlement. But major changes will be limited to handling of national emergency.

Plan is to substitute government seizure for the 80-day injunction. Also let the emergency board make recommendations. Then the new War Labor Board can handle these disputes without legal conflict.

Taft thinks separate agencies should handle disputes and wage controls. Otherwise, the wage agency would compromise wage controls to settle a dispute and prevent a strike.

That is the industry view, too. But it will not win out. The Wage Stabilization Board is setting up regional boards and soon expects to be in the disputes-setting business.

Wage controls will be soft. Unions and other groups of workers will be allowed to "catch-up" with the pattern of 10%, fifth-round wage increases. And cost-of-living wage escalators, like General Motors', will not be upset for the time being.

Big wage policy decision won't come until spring. That's when WSB must decide whether to let wages keep rising with living costs, and how to handle 4-cent annual productivity boosts.

• • •

Lagging domestic mineral development is behind a brewing row in Washington. Other industries have jumped at governmentoffers of loans, loan guarantees, fast tax write-offs for new facilities. Steel has taken write-offs for $3-billion of new facilities. As of mid-February, not a single mining project had qualified for any of these benefits.

FOR A **FUNCTIONAL** SURFACE FINISH

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20[a.] √ [c.] ×

a. CONTROLLED SURFACE ROUGHNESS
Any desired surface roughness duplicated in every part

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A true geometrically-accurate surface with no high spots to break the lubricating film and cause high localized heat

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* SURFACE-FINISH SYMBOLS recommended by SAE Surface Finish Committee and its sponsor the American Standards Association.

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Detroit

The rail strike of early February showed vividly the hand-to-mouth state of automotive operations. Almost immediately operations started to shuttle down in various assembly plants. There were practically no inventories of scarce materials on hand at manufacturing points. The minute shipments were curtailed (both from primary suppliers and from manufacturing points to assembly points) auto and truck assemblies withered up.

• • •

Output had reached a level of about 168,000 units a week, U. S. and Canadian plants included, at the end of January. It started to dive as the turn was made into February, and fell down considerably in the first full week of this month. Breakup of the rail strike during that week pointed to a full resumption of operations by mid-month, and continuation of the level around 170,000 units a week.

This rate can be expected to be maintained—barring new unforeseen problems—through most of March, maybe beyond. April now looks like the target time when manufacturing volume will go down. How far? That's in the lap of the gods. Steel is somewhat more available currently, but copper and—less important—aluminum are posers.

• • •

There's plenty of military business booked into the auto plants today. One recent tally of big contracts alone shows around $3-billion in commitments placed. The problem is that these big contracts won't come into manufacturing stages for a long, long time.

The first of them—tanks and such—will be in production on a very slow basis next summer. (Military trucks, of course, are already being produced.) But other jobs (including all aircraft work assigned to auto plants) may be a year or more away from output and employment of note.

From another standpoint, that $3-billion represents only 25% or so of the auto industry's gross product in 1950. Even if the way were clear right now for an instant start on these war contracts, they wouldn't take up too much of an employment slack created by large curtailment of auto production.

Before long, though, the bulk of military contracts may tally up to a point much closer to automotive volume of last year's dimensions. You can hear in whispers about gigantic awards in the works—commitments which total up into the hundreds of millions of dollars.

• • •

Employment seems to keep edging up in the Detroit tool shops. The gains, however, are rather small; the more impressive fact is that practically no shops of any consequence are reducing staff, while all of them are either holding firm or adding very slightly. With employment totals perhaps 5% higher than a year ago at this time, delivery promises in terms of days are about 10% longer.

Farther back in the scenery, engineering departments are operating at top speed—most of them at capacity and overtime. All companies seem to be on a hunt for technical talent. All are finding trouble locating qualified men. Local advertising for technicians, incidentally, has competition from outside—aircraft companies and others far from Detroit are hunting via the newspapers for staff people in all technical categories.

• • •

The war's first automobile output casualty was the result of the aforementioned Thunderjet job—GM's Kansas City plant is stopping Buick-Olds-Pontiac assemblies there to make the planes.

The second is due along shortly. Chrysler has revealed it will close its Evansville (Ind.) plant, hitherto assemblying Plymouths. This plant will be earmarked for war work as yet undisclosed; the assemblies formerly carried on there will be shifted into Detroit. Simultaneously, Briggs is closing its body feeder plant at Evansville.

• • •

Despite hedging preparations for military work, the feeling in Detroit still is that automobile output will be permitted for a long time ahead, barring full-scale war. Tool work for 1952 models is already in the shops (along with a commitment from producers to Washington that whenever it gets in the way of military business it will be withdrawn).

And plans for new models are still being made. New models themselves are actually being introduced. Brightest recent example: The showing for the first time at the Chicago Automobile Show, at mid-month, of the new Nash-Healey, to be made in limited quantity this year for the American sports market.

The Nash-Healey, 38 inches high, travels 125 mph with its 125-hp racing head 8.1-to-1 compression ratio engine. Nash is making the engine and major mechanical parts; Donald Healey Co., Warwick, England, is making the bodies.

Specs: Torque tube drive; coil spring suspension at rear and Healey trailing link with coil springs at front; 3.54:1 axle ratio; 234.8 cu in. displacement; 3-speed axle with overdrive; overall length, 170 in.; weight 2600 lb. As to price—best guesses are around $4000.

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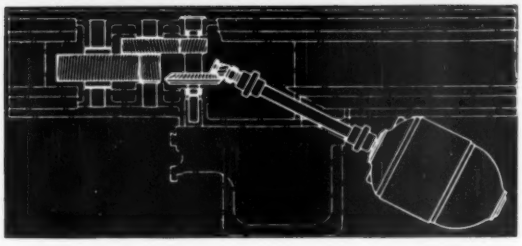

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Machine Tools

Machine tool pool orders will begin going to builders sometime this month. The lists sent out by NPA's Machinery Division for checking by builders have been returned to Washington, and final processing has begun.

April 1 was originally set as the date for completion of distribution of these orders, according to reliable reports. But an effort will be made to finish the job much sooner. Many orders, for instance, will go out in February.

• • •

Requirements of our allies, including the British, as well as U.S. defense needs, were taken into consideration by NPA in arriving at the types, sizes and numbers of machines going into pool orders.

NPA is reported trying to work out some satisfactory way of including the special-purpose machinery builders and press builders in pool orders. Perhaps the only feasible plan is to give a pool order for standard units which go into special-purpose machines.

Pool orders will carry these advantages: they will enable builders to get materials and components because they automatically have a DO rating. They also will act as an insurance policy for builders in case anything should happen to cut down or eliminate the defense program, thereby precipitating an avalanche of cancellations.

• • •

A "distribution order" similar to General Preference Order E-1-B of World War II is likely to be issued by NPA before long. It will tell machine tool builders where machine tools are to be distributed, with a certain ratio assigned to civilian users.

Under terms of revised 1950 version of E-1-B (for details see *AM* August 21, 1950, p 148) "service purchasers" would get specified percentage of machines built (possibly 75%) and "other purchasers" the remainder.

"Service purchasers" would mean all elements of Department of Defense or prime or subcontractors. "Other purchasers" would include Atomic Energy Commission, all foreign buyers including Canadian, except when a Canadian company is working on U.S. prime or subcontracts.

• • •

A 90-day "freeze period" of builders' order boards would take effect under revised E-1-B. Only change would be by diversion directed by the defense agency involved. Allocation of machines among "service purchasers" would be on basis of urgency standings set up for end items by Joint Chiefs of Staff.

Though some of details of proposed "distribution order" may be changed from the revised E-1-B plan, it is believed that the general procedure just described will be followed.

• • •

NPA has issued DO orders to machine tool builders for 577 machines for the British which cannot be obtained elsewhere. Some 220 more machines are about to be covered by DO's for the British, and other 80 are to follow.

A fifth schedule for the British defense program, over and above the four already out, will contain about 350 U.S. machines. It appears probable that some 70 of them will get DO's right away. Total U.S. machine tools placed by British (with fifth schedule added) is 3800.

It is understood that some British machines with no priority rating today are more important than those with ratings. These machines are sure to be covered by DO's eventually.

• • •

British have decided upon expansion of their defense program. It may mean a doubling of machine tool requirements from United States.

A.J.M. Baker, machine tool consultant to ECA Mission in London, will be in this country for 10 days beginning Feb. 14 to try to expedite British orders for U.S. machines. Meanwhile, James Blackshaw, Under-Secretary for Ministry of Supply, will be on the Continent to look for new sources for machine tools for British program.

All MDAP (Mutual Defense Assistance Program) machine tool orders carrying priorities are being assigned DO-35's.

• • •

French orders for some 75-80 U.S. machines have come through. But MDAP business (aside from British, which is expedited by British use of their own dollars) will be slow in developing, because each individual project must be screened and approved.

• • •

Tighest squeeze is in boring mills. British needs on top of our own put a terrific load on builders. Some builders are concentrating on types and sizes which defense contractors have asked for, and are actually discontinuing others. This has been done voluntarily without Washington pressure.

• • •

Fisher Body may again become a maker of heavy machine tools, as it was in World War II. Negotiations are on looking toward such action.

• • •

Machine tool orders are believed to have been as heavy in January as in December.

• • •

Builders are running two shifts 50-55 hr a week on the average, but are falling far behind in shipments compared with new orders. Subcontracting is growing.

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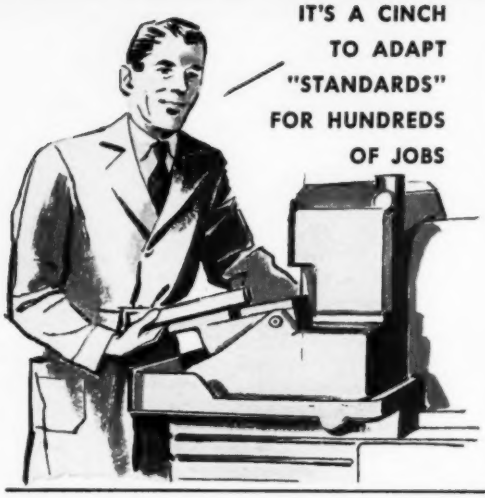

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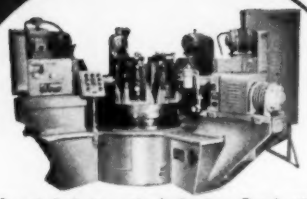

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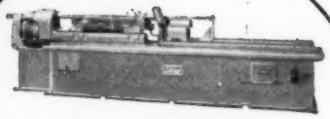

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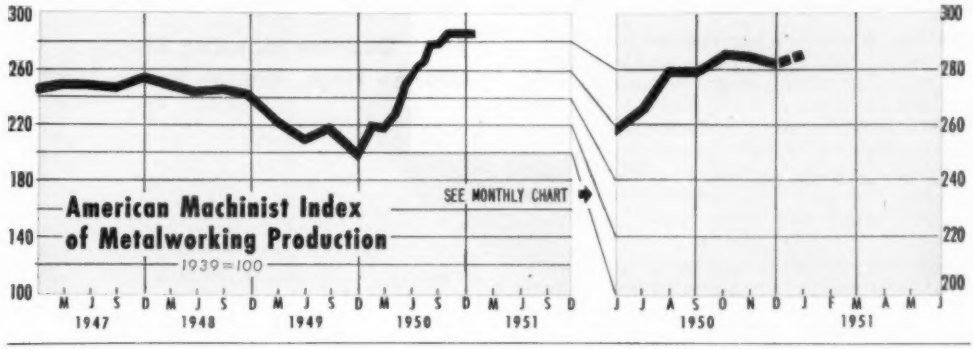
WRITE FOR ENGINEERING CATALOG NUMBER 51

Gaging Metalworking



Metalworking Gains to Continue 1st Quarter

Metalworking plants still are chewing up all the metal they can get before further restrictions are put on. Despite any possible decline in March, the first quarter will compare favorably with the same period a year ago. Gains will be scored in many segments of Metalworking.

Managements are plagued by two jobs at once: keeping civilian-goods output as high as possible; and getting defense contracts and tooling to produce under those contracts. The "in-between" period of conversion is close at hand.

March 1 is set as the target date when the military is supposed to know what it wants and how much. Then the prospective production program will jell.

Fact remains that defense output will be very slim first half of year. Production on many big projects will not begin to roll until final quarter of 1951.

• • •

Production foundries see no letup in demand, as DO orders in March will more than offset any cutbacks in civilian-goods work.

• • •

Uncertainty about steel deliveries is adding to troubles of most metalworking plants in scheduling operations. Monthly steel allocations to customers are proving to be more of an estimate than an allotment. Seldom do users get what they have been promised.

An order issued by one steel mill was an eye-opener —that no DO-rated orders would be filled for less than five tons. This means either the padding of orders placed by customers or relying on warehouses, which are having same trouble getting steel from mills as users.

Though new orders for defense tooling are growing, they still comprise less than 20% of total business for contract tool and die shops. New orders over-all were down a bit in December, but shipments zoomed. Business was up 69% in 1950 compared with 1949.

Machining of precision aircraft parts has been taken on by some tool and die shops as orders for civilian work fell off. Scarcity of qualified journeymen is plaguing many shops which thus are resorting to much overtime.

• • •

Aircraft industry in California has been hiring about 5000 men a month the past five months. Net gain in employment during 1950 was 31,800, bringing the total to 108,000.

• • •

Stamping shops are doing less business than they were. No improvement is expected until well into second quarter. Full-scale production may not be resumed, in fact, until after midyear. Reason for slump: lack of raw materials for civilian goods and delay in placing orders.

INDEX

	JAN. '51	DEC. '51(p)	NOV. '51(r)	JAN. '50
	285*	282	283	221
Machinery	268	268	268	199
Electrical Manufacturing	329	330	330	246
Automobiles, Trucks	237	243	243	218
Transportation Equipment	295	292	292	208
Other Metalworking	304	305	305	246

AMERICAN MACHINIST'S INDEX OF METALWORKING PRODUCTION is based on manhours worked in the five components above.

* Estimated (p) Preliminary (r) Revised

Gaging Business

Expansion of metalworking facilities is proceeding at one of the fastest paces in history. It is being helped immensely by the five-year amortization program.

Manufacturers of these products have received certificates of necessity for quick write-offs the past few weeks: railway cars, electronic relays and coils, tank and airplane parts, precision instruments, gun tubes.

• • •

Loss in steel production caused by the railway strike cannot be made up. Reason: it is not possible for steel mills to run much higher than their rated capacity. They would have operated at or above capacity without a strike straight through the winter and spring.

• • •

Housing "starts" will be high during first quarter. An average of about 80,000 per month is expected in the January-March period.

Government agencies are committed to build more than 300,000 houses the first half of 1951. Materials shortage is only restraining factor.

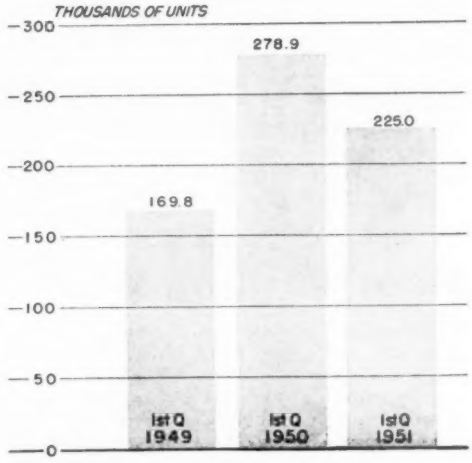
• • •

Pending increases in excise taxes have touched off a new buying wave in consumer durable goods. Inventories are sure to hit bottom before long. Scare buying of cars and trucks has bumped sales above the 1950 level, which was fantastically high.

Used car market is very active again. That indicates that new car sales will continue at peak volume indefinitely.

Manufacturers' sales soared to a new record in 1950: $235 billion. That was 18% above the 1949 total and 10% better than in 1948.

First Quarter Housing Starts Will Be High, Though Below 1950



January 15 price index of Bureau of Labor Statistics will show enough rise in past three months to warrant wage increase of 5-6 cents an hour for General Motors and other employees working under cost-of-living escalator-clause contracts. Question is whether Washington will try to exclude these contracts from the freeze.

• • •

Productivity in manufacturing industries gained 16% in the 1939-1949 period, only a little more than 1.5% a year.

WEEKLY BUSINESS INDICATORS

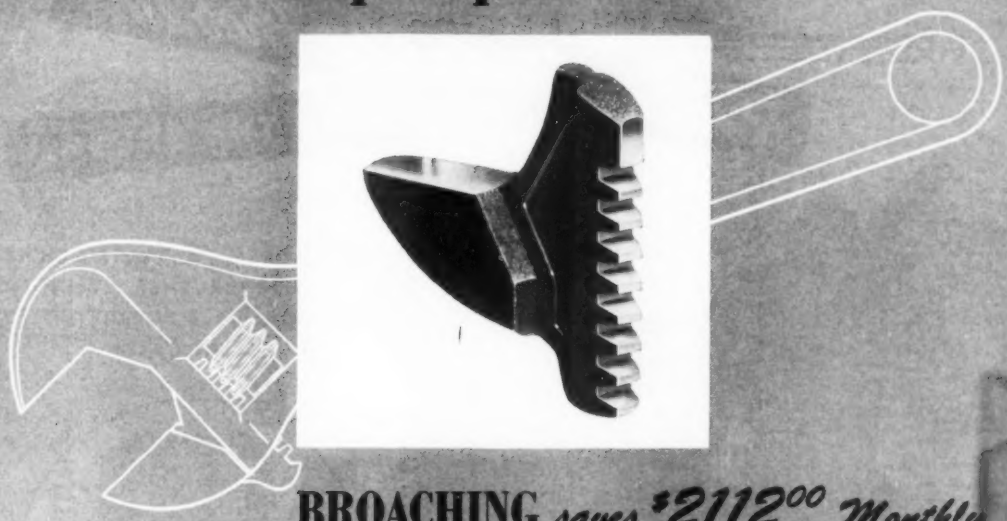
	Latest Week	Preceding Week	Year Ago
Business Week Index Activity (1923-1925 = 100)*	236.9	236.7	194.6
Steel ingot operations (% of capacity)	96.7	101.3	87.3
Electric power output (million kilowatt hours)	7,099	6,970	6,062
Production of automobiles and trucks	152,721	167,869	127,428
Engineering construction awards (Eng. News-Rec., millions)	$555.7	$235.1	$141.9

MONTHLY BUSINESS INDICATORS

	Latest Month	Preceding Month	Year Ago
Refrigerators, domestic sales (thousands of units)	370	386	259
Vacuum cleaners sales (thousands of units)	289	265	269
Washers sales (thousands of units)	377	380	238
Household electric ranges sales (thousands of units)	124	128	75
Television receivers production	908	752	292
Home radio receivers production (thousands of units)	999	816	710
Gear sales index (1935-1939 = 100)	680.4	554.9	242.8
Foundry equipment new orders index (shipment 1937-1939 = 100)	526.2	885.5	201.0

* Seasonably adjusted.

Lower Cost-per-piece:



BROACHING saves $2112.00 Monthly

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2 Re-design present broaches and broaching set-ups to make them more efficient.

Two milling machines and two operators per shift, two shifts a day, were required to produce the rack teeth and finish the jaw face on 8000 movable wrench jaw forgings. The Detroit Broach set-up which has replaced the milling operations produces the same number of parts with one operator, one machine, on one shift per day . . . savings in labor alone amount to $2112.00 monthly! And that's not all.

The original tool cost for the broaching set-up was lower and the cost of tool maintenance is reduced materially. In respect to quality, the manufacturer reports much better surface finish, more consistent dimensions, uniformity of parts.

If you are boring, slotting, reaming or milling your parts, chances are that Detroit Broach can reduce your cost-per-piece. Why not investigate today? Detroit Broach engineers will gladly discuss your operations and give you actual cost and production data on broaching them.

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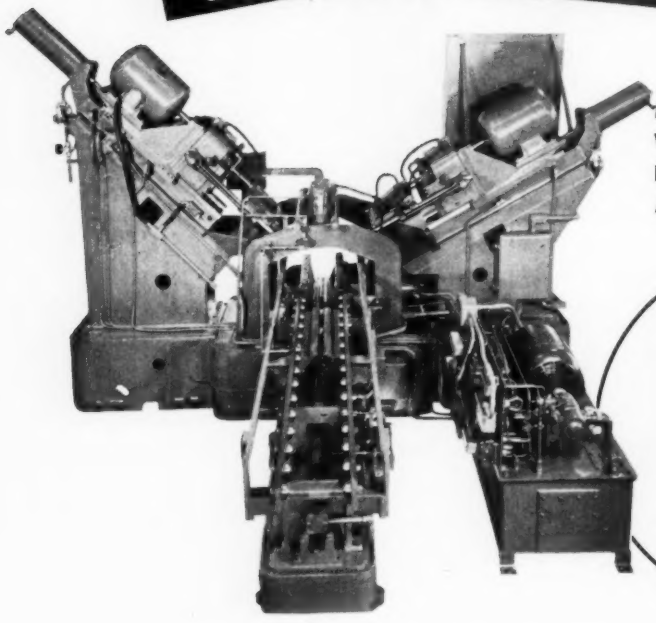
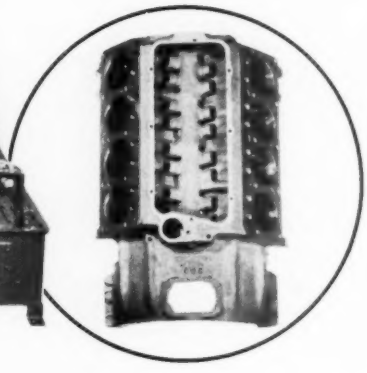
Engine Production Problem "GETS THE BRUSH!"



MORRIS *Mor-Speed* MACHINE WIRE BRUSHES CYLINDER BORES and TAPPET HOLES AUTOMATICALLY . . . .



"Untouched by human hands," this massive V-8 engine block is automatically loaded, clamped, wire brushed on both banks, then automatically unloaded to the production conveyor.

Installed in the plant of a leading auto manufacturer, this Morris Production Machine speeds the production of a new super-powered engine. In the view shown here, the left hand hydraulically operated angular slide carries four wire brushes for the cylinder bores. The other angular slide carries eight brushes for the tappet holes. Automatic 180° indexing allows alternate brushing of both cylinder banks.

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American Machinist

MAGAZINE OF METALWORKING PRODUCTION ★ ESTABLISHED 1877

Metalworking's Five Challenging Problems

Five challenging problems face Metalworking management as the defense program begins:

1 Substitute materials. Critical shortages make it the foremost problem just now.

Copper and aluminum already are on the restricted list for certain uses. Copper is particularly hard to get, and much less of it will be available later on.

Steel and other metals are being specified instead of copper. Plastics, in turn, are being tried in place of steel.

These sudden and important shifts mean that manufacturers should have, or should acquire quickly, a working knowledge of "new" materials, if the substitutes are to be given a fair chance. That imposes upon management a new responsibility — for learning know-how and training its people in it.

2 Strange materials. Heat-resistant alloys for jet engines illustrate the point. Metalworking had little if any experience with these alloys until recently. Now, with the plane program growing rapidly, many production men should master the art of producing war goods with these alloys and with their less-strategic, but harder to fabricate, successors.

3 More production from fewer men and from less material. This is a long-standing problem which has been intensified by the present emergency.

Greater mechanization is one of the answers. Better tooling, including wider application of carbides, is another. More high-speed machining should be done. Work should be loaded and unloaded faster, thus keeping machines running more of the time.

4 Train regular workers to do new jobs. This problem promises to be one of the most pressing of all. New processes and new materials are worth little unless workers are made familiar with them. Otherwise excessive scrappage and low productivity are inevitable.

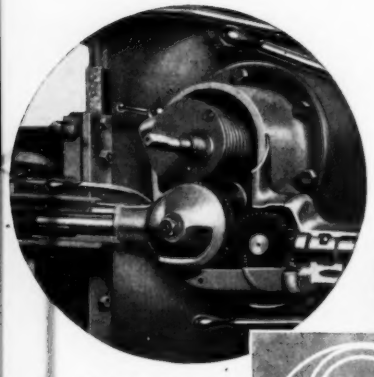
5 Make your equipment last longer. It's going to be tough getting new machines. The old ones must do. That calls for treating them well, and perhaps pampering them a bit. You'd do it with your car. Why not with your machines?

Management cannot afford to be hidebound in the defense period ahead. It should be more receptive to new ideas than ever before. It should be ready to improvise, to make quick changes, and to adapt itself to those changes with a minimum loss in efficiency.

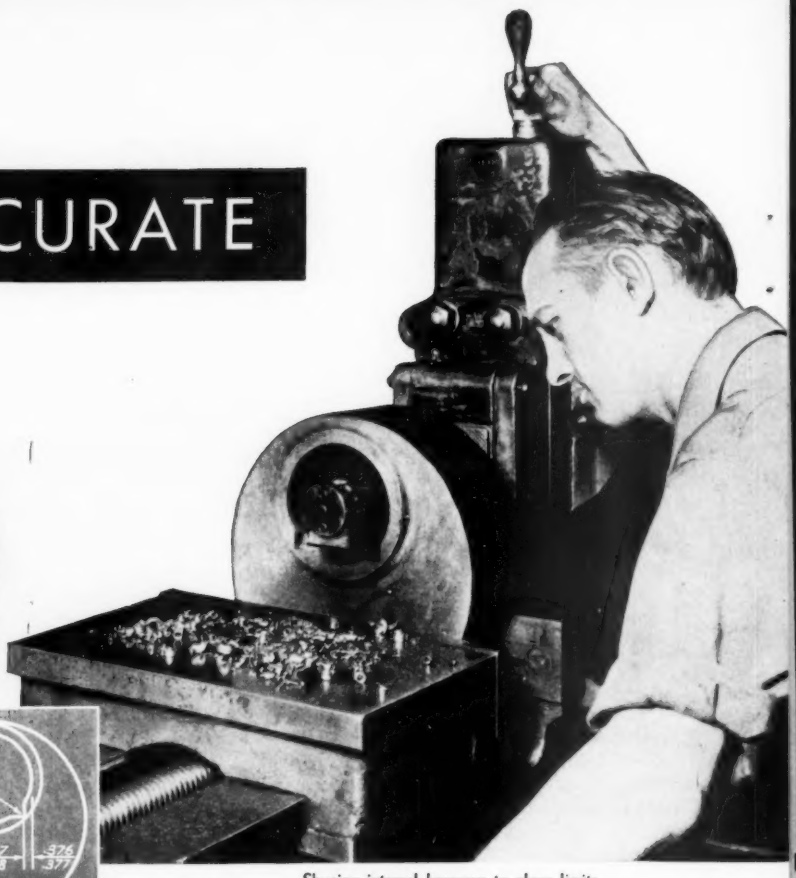
One of the best things that it can do is to have well in hand these five problems which loom above all others.

Burnham Finney

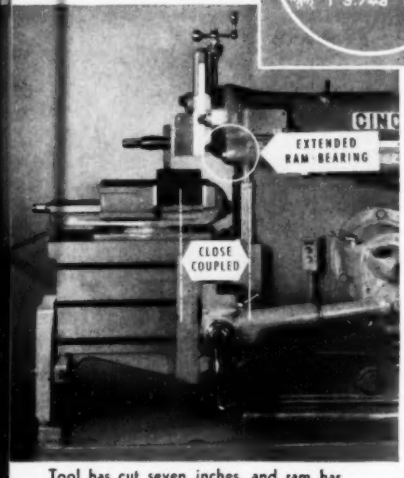
ACCURATE



Exclusive Cincinnati Feed Mechanism



Shaping internal keyways to close limits.



Tool has cut seven inches, and ram has not moved beyond bearing support.

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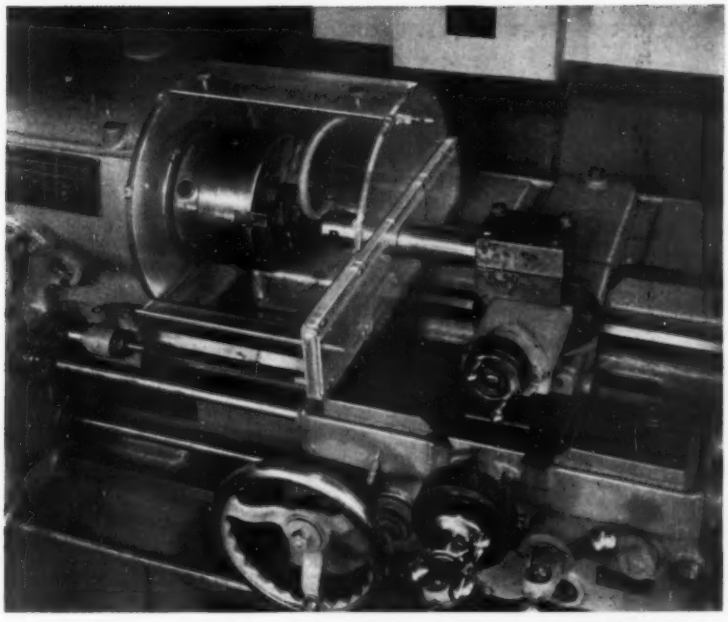


ENGINE-LATHE HOOD protects operator during machining of contaminated materials. Hood is attached to headstock and clears carriage as it advances along ways. Chips fall on stainless steel pan that forms bottom of enclosure

American Machinist

ARMAMENT REPORT

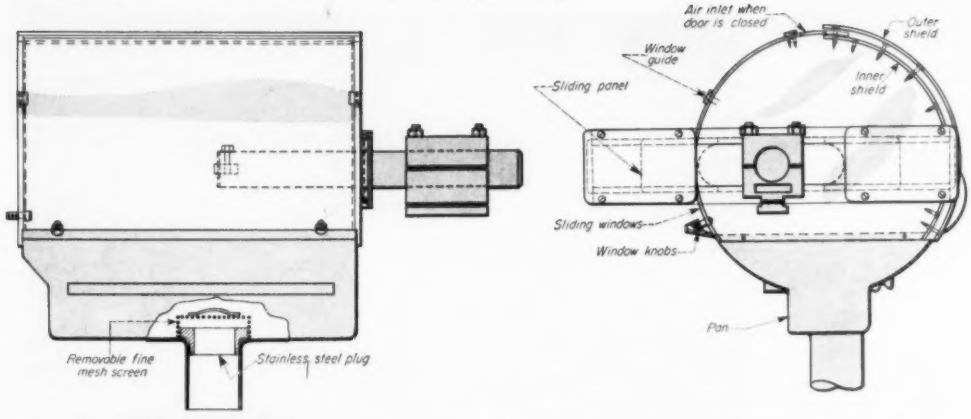
HOODED MACHINES RUN TOXIC AND RADIOACTIVE JOBS

Enclosures protect workers during machining of special materials for atomic research

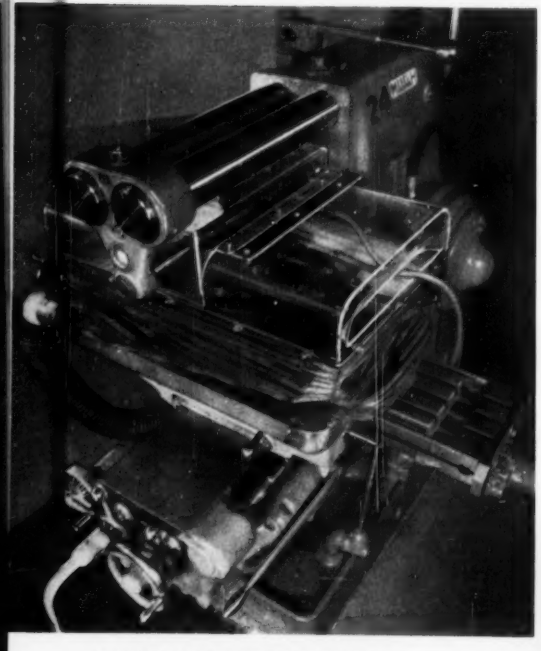
By S. S. GOLD, Mechanical Engineer
ARGONNE NATIONAL LABORATORY, Chicago, Illinois

EXPOSURE encountered in the machining of toxic and of radioactive materials has been brought within safe working limits at the Argonne National Laboratory. Hoods now enclose the entire working area of all machines on which these materials must be run. These enclosures not only protect workers against toxic materials, but also permit recovery of chips and turnings from special materials right at the machine.

Developed at the Laboratory, the enclosures isolate the area in which cutting takes place from the remainder of the machine. In this way, contamination is confined to a small area enclosed by surfaces that have been designed so they can be decontaminated easily. The remainder of the machine is not exposed and does not become contaminated. The problem of chips is solved by catching the chips in a pan that forms the bottom of the enclosure and prevents chips from contacting the machine. A coolant-system, separate from that of the machine, provides a continuous supply of filtered coolant on those jobs that are machined wet. A separate exhaust system ventilates the hoods. Thus, the enclosures plus their related equipment actually comprise a complete system superimposed upon a standard machine tool to outfit that unit for the machining of special materials. *(Next page, please)*



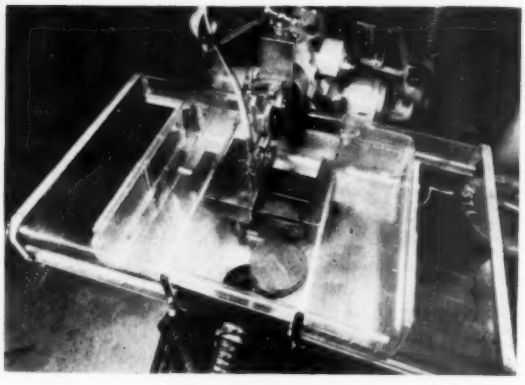
HOOD CONSTRUCTION prevents exposure of contaminated surfaces of sliding members. Window slides between shields; panel also is enclosed. Capscrews fasten hood to headstock

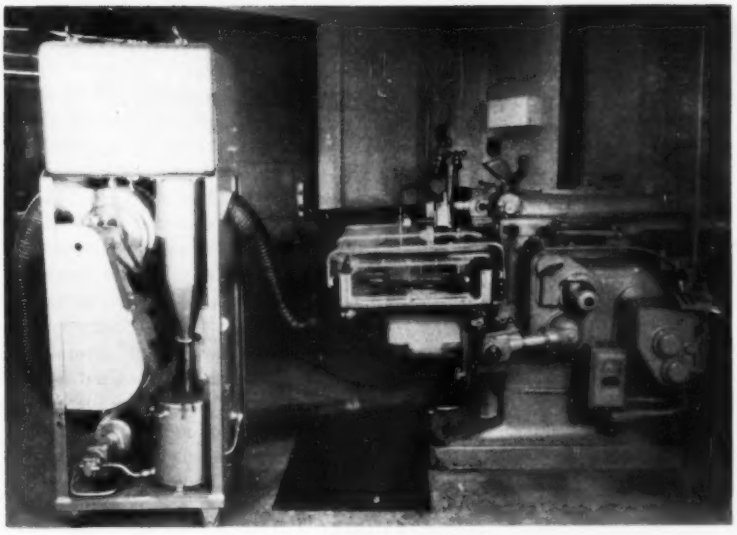


MILLING-MACHINE ENCLOSURE has steel pan fastened to machine table and Lucite sections supported by arbor and by brackets on machine column. Multiflex bellows, fiberglas lined, completes enclosure and permits relative motions between work and cutter. Quick-release fasteners in bellows speed work-handling operations

SHAPER HOOD has top consisting of two sections that slide on stainless steel rails and rollers to permit loading and unloading work. Base of enclosure is attached to work table →

Thus far, enclosures have been added to lathes, milling machines, drillpresses, grinders, shapers, small hydraulic presses, and cut-off machines. In every case, it has been possible to design a hood that in no way limits the usefulness of the machine. Full table travel can be obtained and the full capacity of the machine can be utilized. Machining can be done wet or dry. During an operation, air is exhausted from the enclosure and is replaced by room air which enters through openings in the enclosure at 100 to 150 linear fpm. Air inlets are located to avoid whipping the coolant and are baffled if necessary. Both coolant and air are exhausted into a common drain and are carried to a separation and filtration unit where they are separated and individually filtered. Coolant is piped back to the machine. The exhaust air passes to the fan house where an air cleaner and an electrostatic precipitator remove toxic materials from the discharge air.





COMPLETE SETUP for wet machining includes separation and filtration unit. Contaminated air and coolant are drawn from hood, separated and individually filtered. Filtered air is exhausted to the Rotoclone, electrostatic precipitators, final filters, and then outdoors. Filtered coolant is returned to hood

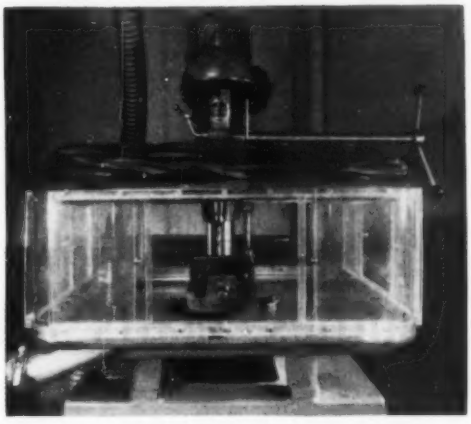
Considerable care also has been taken to design a hood that offers maximum protection with minimum interference in the operation of the machine. All controls are located outside the enclosure, both for ease of operation and for protection against contamination. For those parts of the hood that must permit a clear view of the machine, Lucite, or some other transparent material, has been selected. The pan and other metallic parts that must be decontaminated are of stainless steel construction.

Contaminated Dust Can Not Escape

Overlapping parts of the hood are made so the coolant carries all chips into the pan and not out onto the machine. Because of the construction of the drain, the bottom of the pan always is covered with a layer of water ½ to 1 in. deep. This quenches hot chips and aids in recovering greater amounts of the material being machined. Doors do not swing open, but slide into protective enclosures. This prevents the spread of contaminated dust to the outside surfaces of the enclosure. All parts of the hood are formed with large radii so particles of material can be removed and the hood decontaminated more readily during the cleaning operations that are performed from time to time.

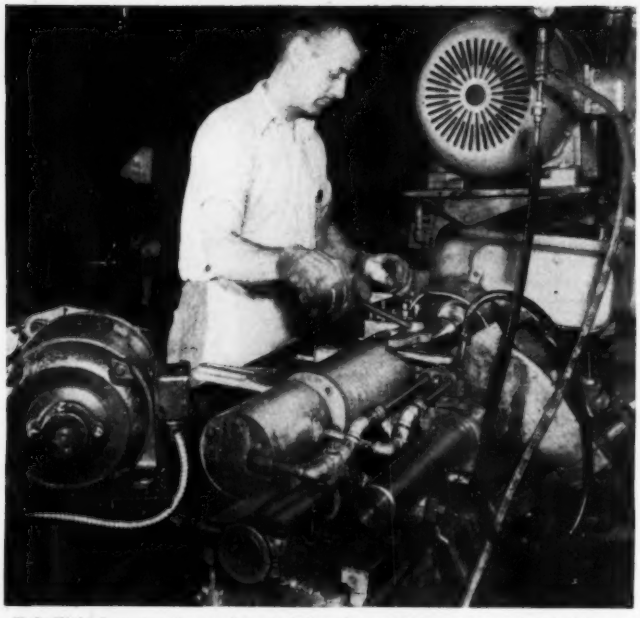
When required, connections to the exhaust system and the coolant delivery pipe are broken and the hood is removed from the machine. Chips are removed and the hood is decontaminated and returned to service.

First applied in July to September, 1949, these hoods have proved entirely satisfactory in operation during the past 15 months. Actual checks by the Radiological Physics Division of the air over the hood have indicated that the volume of toxic dust in the room is well below the tolerance limits, and machine operators state that there is a minimum of hindrance to both visibility and actual operation of the machines.



DRILLPRESS ENCLOSURE provides ample space for work-holding devices. Doors slide so contaminated surfaces always are within enclosure

The author wishes to express appreciation to N. J. G. Bohlin and the Remote Control Division at Argonne National Laboratory for their cooperation in producing the hoods in our Beryllium Room.



Rebuilt to incorporate precision ball-bearing spindles, air-operated tailstocks and heavier drive motors, Fay automatic lathes are used at Chevrolet-Muncie for qualifying hardened transmission shafts prior to finish grinding. Motor on pedestal at left has small wire brush on end of shaft, is used for cleaning centers in workpieces before placing them in lathe

High-Speed Turning Qualifies Shafts and Gears

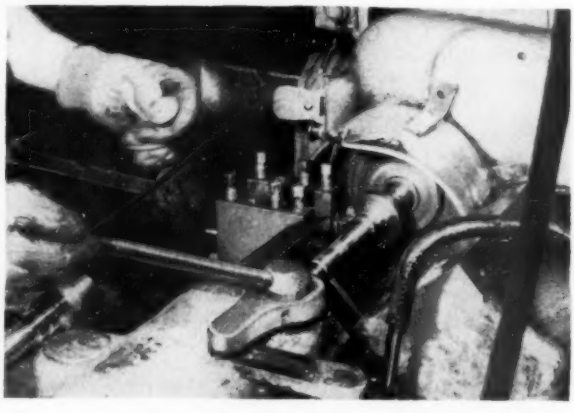
BY JOHN M. FINALLY, Master Mechanic,
Chevrolet-Muncie Division,
GENERAL MOTORS CORPORATION

CARBIDE-TIPPED turning tools have replaced rough-grinding wheels for removing the 0.005-in. deep stock left on transmission shafts at bearing fits for hardening prior to grinding. This stock can be removed faster, and with less tool cost, when turning at surface speeds of 650 to 990 fpm in automatic lathes rebuilt to withstand the high spindle speeds.

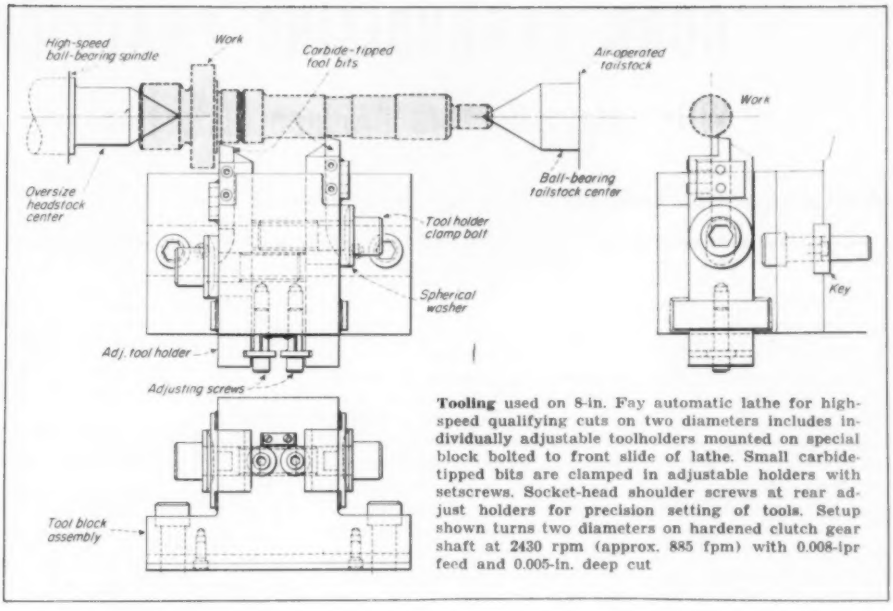
For these qualifying operations, Chevrolet-Muncie production engineers have rebuilt several 8-in. Fay automatic lathes, putting precision ball bearings on the spindles and mounting air-operated ball-bearing tailstocks in place of conventional tailstock units.

These lathes were equipped previously with 7½-hp motors. Today they are driven with 15-hp motors and suitable sheaves to provide the required spindle speeds. In addition, larger brakes have been mounted on the drive shafts to stop the spindles quickly at the higher speeds. These brakes have been mounted outside the machine housings for easy maintenance.

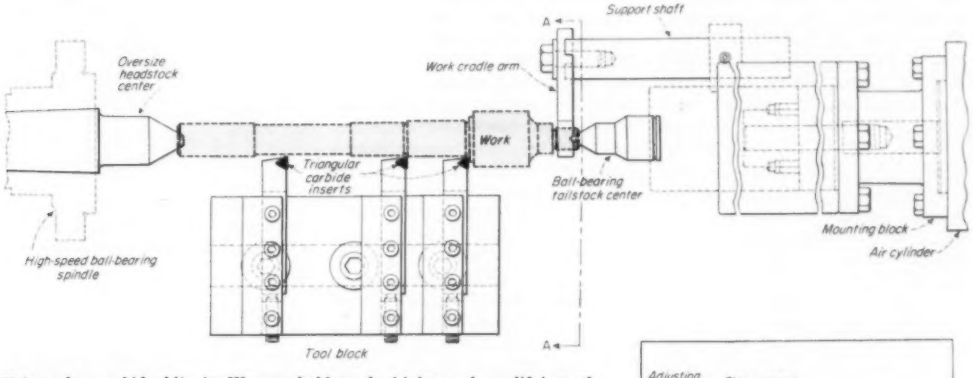
Normal steel-cutting grades of cemented carbide, like Carboloy grade 78-B or Wesson grade WM, have been found entirely satisfactory. Hardness of surfaces turned averages 59 to 63 Rockwell C.



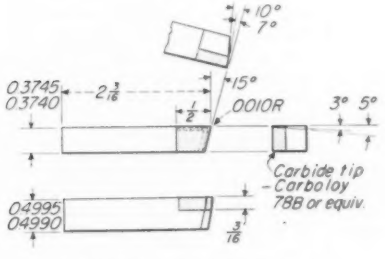
Chucks or driving dogs are not necessary when high-speed-turning transmission shafts prior to finish grinding. Centers in workpieces are enlarged at headstock end to provide larger contact area with center in machine spindle. Pressure of air-operated, ball-bearing tailstock is sufficient to hold workpiece against drive center while taking 0.005-in. deep qualifying cuts



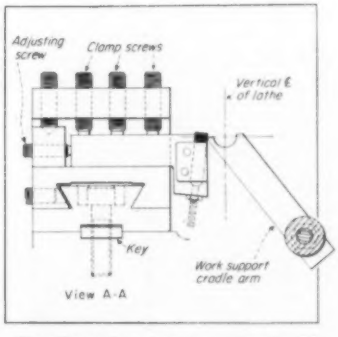
Tooling used on 8-in. Fay automatic lathe for high-speed qualifying cuts on two diameters includes individually adjustable toolholders mounted on special block bolted to front slide of lathe. Small carbide-tipped bits are clamped in adjustable holders with setscrews. Socket-head shoulder screws at rear adjust holders for precision setting of tools. Setup shown turns two diameters on hardened clutch gear shaft at 2430 rpm (approx. 885 fpm) with 0.008-ipr feed and 0.005-in. deep cut



Triangular carbide bits in Wesson holders do high-speed qualifying of transmission mainshafts in 8-in. Fay automatic lathes. Holders position bits for 7° negative rake. This setup has been used in machines operated at 2320 rpm (approx. 650 fpm) and 3530 rpm (approx. 990 fpm) with satisfactory results. Feed is 0.007-in. per rev. with 0.005-in. depth of cut. Workpiece support arm holds shaft against headstock center until air-operated, ball-bearing, tailstock spindle is advanced



Carbide-tipped bits for qualifying AISI A-5145 clutch gear shaft has flat cutting face with clearance and relief angles as shown. The 0.010-in. point radius produces fine finish on hardened workpiece



Negative rake of 7° is achieved with clamp-type holders in heavy toolblock to withstand cutting forces. This cross section shows relationship of tools to cutting axis and to work-cradling arm

GOOD CARBURIZING PRACTICE

VIII . . Many Factors Produce Distortion

Non-symmetrical movement of carburized work as the result of hardening and quenching presents problems that are met by variations in heat treatment

BY T. A. FRISCHMAN, Chief Metallurgist, Axle Division, EATON MANUFACTURING CO.

As applied to heat treating, distortion can be defined as an unsymmetrical dimensional change that occurs in a part when it undergoes thermal treatment. Heating to temperatures below the transformation range, as a rule, will not influence dimensional changes to the same degree as heating to within and above that range. Before hardening or carburizing, the steel must be heated above its transformation temperature range. Thus, other expansions and contractions besides those arising from thermal reasons alone take place due to these transformations from alpha to gamma iron and *vice versa*.

A brief description of the effect of temperature on volume changes is given herewith to help in understanding the phenomenon of distortion. When a piece of steel is heated, say for hardening, it will increase in size due to thermal expansion. But when the lower transformation temperature of the steel is reached, contraction sets in with the allotropic change of alpha to gamma iron. As temperature rises further, the natural thermal expansion is partly offset by contraction caused by formation of austenite. When the entire structure is converted to austenite, contraction ceases and thermal expansion continues unhampered until the desired hardening or carburizing temperature is reached. In cooling from above the upper transformation range, the same phenomena occur in reverse order.

Volume changes are particularly important with intricate shapes, uneven contours, wide divergence in sectional thickness and similar disparities from symmetry. Often dimensional changes are uniform and the term "distortion" is still used to describe the movement.

In general, distortion implies a non-uniformity in change, such as twisting out of shape, eccentricity, bending, crookedness or unevenness. Whether the heating or cooling rates are fast or slow, these volume changes take place in varying degree. Their effect is more pronounced with the increase in relative thickness of the thick and thin sections of a part.

In carburizing, the distortion problem is pronounced because a composite steel has been produced. There is a considerable differential in carbon content from the core to the surface of the case. As a result, the transformation temperatures of each zone differ to a considerable extent. Thus, the case and core do not harden simultaneously. Hence during quenching, various combinations of expansions and contractions take place at the same time, especially if the part is of irregular shape and mass.

Reheatings Cause Distortion

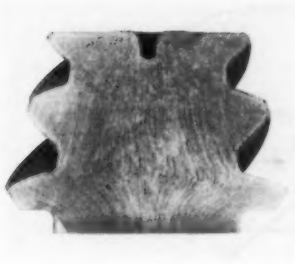
It is evident, therefore, that the fewer times the steel is required to go through its transformation range the less likely it is to distort. For this reason, direct quenching from the carburizer is to be preferred, if freedom from distortion is the paramount consideration. Somewhat more distortion occurs in the heat treatment involving slow cooling from the carburizer followed by a reheating treatment. This procedure is known as the "single quench." Next in likelihood of distortion is the "double quench" treatment which involves quenching from the carburizer followed by a reheating treatment for case refinement.

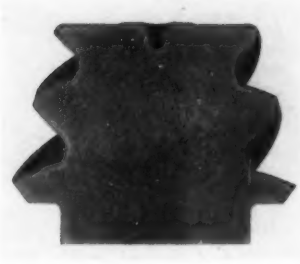
Factors that play a part in causing distortion either singly or together are:

1. Chemical composition
2. Grain size
3. Hardenability
4. Temperature differential
5. Heating and cooling rate
6. Hardening temperature
7. Quenching medium and agitation
8. Support of work in furnace
9. Change in section of part
10. Irregular case depth
11. Effect of prior treatment such as: release of residual stresses by machining; as-forged structures and related grain flow; normalizing, annealing and stress relieving; and cold working such as rolling, drawing, swaging, forming and stamping.

Chemical composition can have an indirect effect on distortion by suppressing the transformation of austenite to martensite. The higher the carbon content (up to the eutectoid composition of approximately 0.85% carbon) and also the alloy content, the greater will be the delay in the start of the transformation process. Also, martensite will form at a lower temperature, and there will be less chance for the formation of intermediate reaction products such as ferrite, pearlite and bainite.

Fine-grained steels Nos. 5 to 8, classified by the standard McQuaid-Ehn test or equivalent ASTM standard method E19, are considered to distort less than coarse-grained steels Nos. 1 through 4. The former have the character-





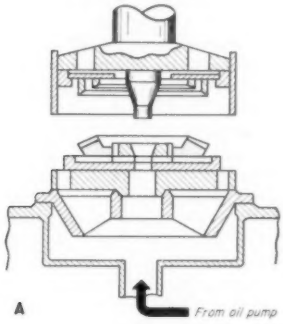
Grain flow, as from forging, has an important bearing on occurence of distortion in carburizing. Left — truck drive pinion has symmetrical flow lines, which are desirable. Right—another forging has unsatisfactory flow-line pattern

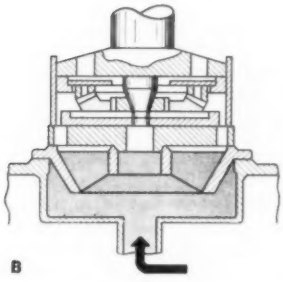
istic of inhibiting coarsening of the austenite grain during carburizing and, to a lesser extent, at hardening temperatures.

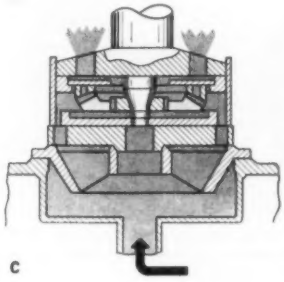
Temperature differential within a furnace causes distortion by promoting different rates of transformation and carbon absorption during carburizing. This results in a case depth differential from part to part or within a specific part. If distortion is to be minimized, control of the rate of heating becomes important and the rate must be as uniform as possible throughout the piece. A fast rate is not particularly injurious if it is uniform.

Non-uniformity of cooling rates, although not always controllable because of section size, is similar in effect to non-uniform heating. The objective of simultaneous transformation, or hardening, of all portions of the section is defeated. Employ a hardening temperature as low as possible, commensurate with the best combination of physical properties.

Quenching mediums exert a profound effect on distortion by virtue of their different rates of cooling. In order of decreased severity of quench and therefore proneness to cause distortion, these mediums are: (1) caustic or brine, (2) water, (3) oil, (4) hot salt or hot oil, and (5) air. When the thinner work sections cool and transform ahead of the more massive sections, stresses of considerable magnitude are set up to cause irregular movement over the part.

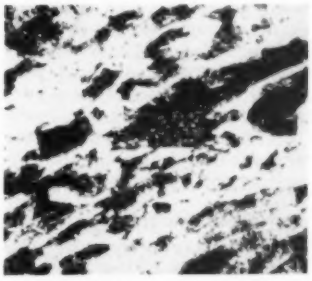






Operating cycle for Gleason No. 26 quenching press: (*A*) Hot gear in quenching position on lower die; (*B*) Upper die clamps work, plastically deforms it to close tolerances, and (*C*) Quenching oil is forced into chamber and around gear for specific time cycle

Gleason Works



Elongated grain structure is produced by cold drawing. (500 X). Other cold-working operations likewise distort grain structure

To minimize these effects, either the pieces or the quenching medium is agitated in an attempt to equalize the rate of heat removal.

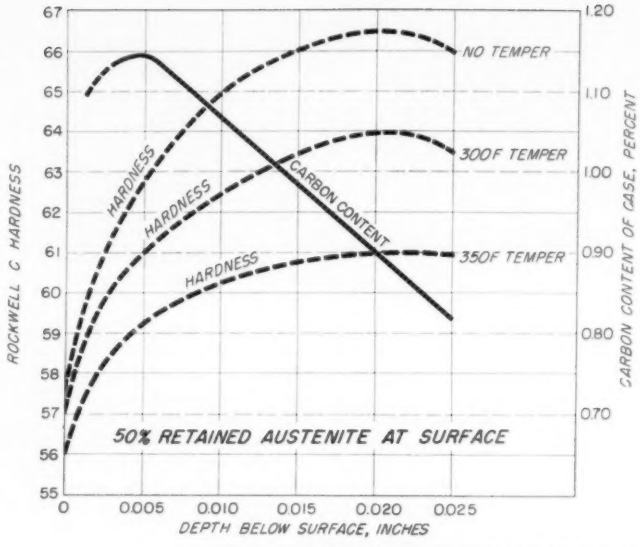
The manner in which work is supported during heating and likewise during quenching has an important bearing upon the degree of final distortion. A common, well-known precaution is to place long pieces in an upright position in both furnace and the quench.

Prior treatment of the steel and its resulting microstructure are important factors in respect to distortion. Some persons believe that forging and finishing temperatures and general forging technique are reflected later in carburizing and hardening operations. It is difficult to believe otherwise when the importance of symmetrical grain flow is considered. Lack of symmetry in flow lines is a frequent explanation for occurrence of distortion. Accompanying illustrations compare satisfactory and unsatisfactory grain flow in an automotive truck drive pinion.

Another prior structure that af-

fects distortion is brought about by cold working as from machining with dull tools. On heating, unexpected stresses are released, and grain growths take place which result in unpredictable hardening action. Prior to carburizing, the normalizing or annealing temperature employed to condition the steel for efficient machining should equal or, better still, exceed the carburizing temperature.

Customary cold-working operations such as rolling, drawing, swaging, forming and stamping usually produce severely distorted grain structures. Where any of these operations have been performed on the material, use a normalizing or annealing treatment, (or even a stress-relieving treatment might suffice) before the carburizing and hardening operation.



Increase in tempering temperature does not have as great an effect in reducing the hardness at the surface of a 50% austenitic structure as on one with

Controlling Distortion

Various means are employed to control distortion; that is, non-uniform movements or dimensional changes. Control is effected by keeping uniform the change from the "green" or unhardened state to "hard" condition. To accomplish this, special equipment such as quenching presses, jigs, hardening plugs, platen presses, quenching sprays and special quenching fixtures and containers are used. These mechanical appurtenances are supplemented by prior treatments previously discussed; and by delayed quenching practice, oil circulation and agitation, control of quenching oil temperature; and quenching into hot mediums such as salt or oil, (the process known as martempering).

A simple way to control bore size or internal spline diameter to runout as small as 0.001 in., if the movement from "green" to "hard" is contractive, is by the expedient of quenching plugs (illustrated). These may be made from high-speed steel and serrated on the outer diameter to allow oil circulation.

Platen presses are used to control distortion of thin parts such as plates, washers and strips, and can be adapted to air, water or oil quenching by suitable design.

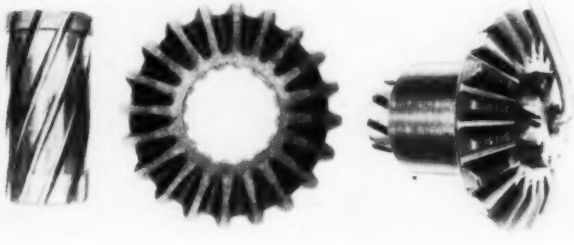
Quenching sprays are used only in limited applications. They require considerable volume of liquid at high rates of input to accomplish effective results in practice.

Tank quenching is most universally used. Parts can be shaken or agitated manually but best results are obtained where automatic movements of the pieces are provided. Instead of moving the part in the quenching medium, present-day practice calls for rapid circulation of oil through headers and drilled pipes. High-capacity pumps recirculate the oil in and out of the tank instead of relying on agitation developed by the incoming oil.

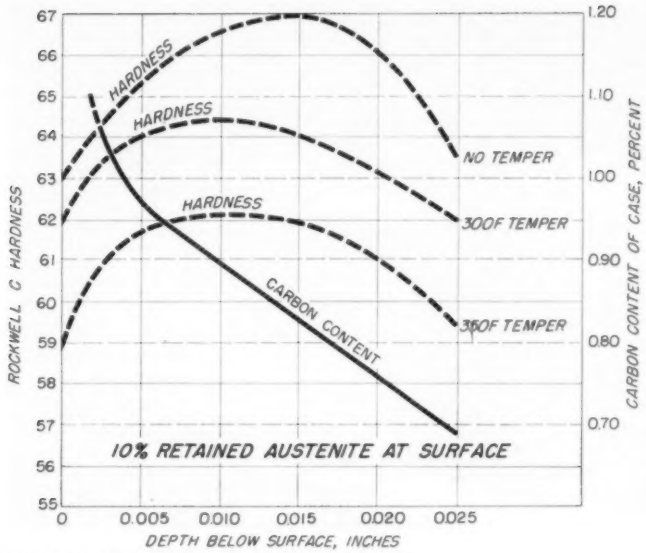
"Egg-crate" compartments, either circular or square, with pipe sprays in the bottom for forcing the oil upward, are used to quench elongated objects such as drive pinions and spline shafts in order to keep them straight. Where continuous or pit-type gas carburizers are used, articles such as these are supported vertically in the furnace and quenched in a similar manner.

At times, delaying the quench, more so from the carburizing temperature than from usual hardening temperatures, aids in controlling distortion.

Last, but by no means least, are the possibilities of relief from distortion by martempering. With this method thick and thin sections of an individual piece are rapidly quenched in hot salt or hot oil to immediately above the martensite



A quenching plug is one means of controlling run-out of a gear hole to 0.001 in. Plug is dropped into hot gear prior to immersing both in quenchant, using hook in hollow plug. Gear contracts upon plug on cooling.



only 10% austenite. However, the latter structure starts at a higher hardness level. Steel: SAE 4620

transformation range. This step equalizes the temperature within the piece. Next, transformation to martensite is permitted while air cooling to room temperature.

Tempering Procedure

Tempering, as used in conjunction with carburizing and hardening, is a low-temperature heat treatment employed primarily for the benefit of the case. It increases the resistance to impact, helps to prevent grinding cracks or checks, aids in reducing residual stress, minimizes chipping of the ends of clash gear teeth and also facilitates lapping of tooth contacts in gear manufacture. General range of temperature for tempering carburized work is from 275 to 375 F. Temperatures above the latter figure are frequently employed in applications where hardness must be sacrificed for ductility and toughness. File hardness in turn also decreases rapidly when temperatures in excess of 375 F are employed.

In shop parlance, the term "drawing" is often used, though the preferred technical usage is "tempering". The customary time at temperature for effective tempering is from two to three hours.

For maximum assurance that cracking or checking will not develop during grinding of carburized and hardened work, it is essential that the tempering temperature be at least 325 F or better still 350 to 375 F. As an added precaution, grinding is sometimes carried out with the piece completely submerged in oil.

Final hardness after tempering is related to the type of steel, its microstructure and level of hardness in the as-quenched, untempered condition. If the hardness is high enough originally and the microstructure is martensitic, relatively high tempering temperatures are required to lower the Rockwell hardness below C59. This is illustrated by the accompanying table.

Tempering, on the other hand, does not appear to have as much effect on reducing the hardness of direct-quenched carburized cases containing retained austenite as those which are more martensitic or entirely so. This observation is borne out by reference to an accompanying chart showing the relationship between case hardness, tempering and carbon content when 50% retained austenite is found at the surface of the case. By tempering at 350 F, a loss of only 2½ points Rockwell C is experienced at a point 0.0025 in. below the surface. Compare this drop in hardness with that at a point 0.020 under the surface where the drop is 5½ points Rockwell C due to the 350 F temper. At the 0.020 in. depth, the microstructure was entirely martensitic, and showed the highest as-quenched hardness of any point throughout the case. Note also that the carbon content at this point was 0.90% in comparison with over 1.10% at the surface.

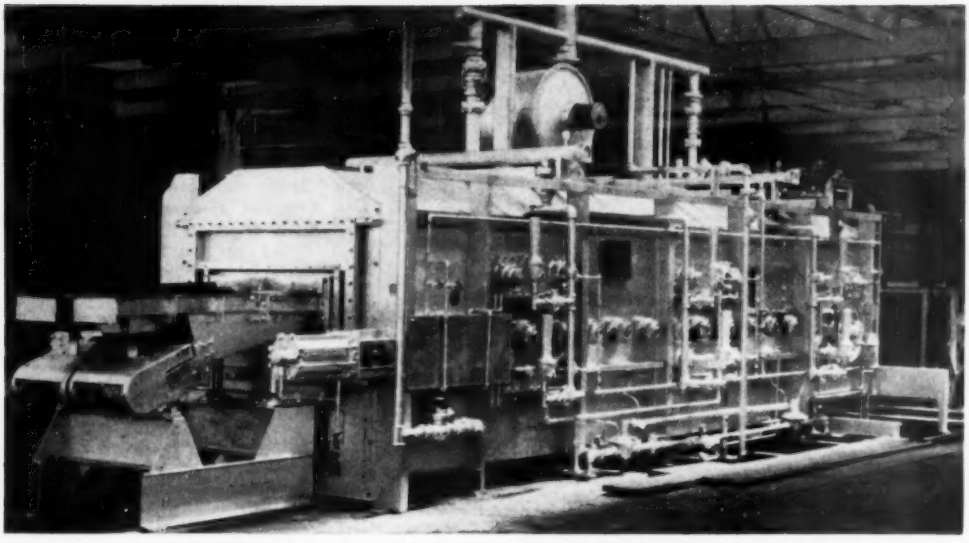
A second chart illustrates how a more martensitic case (10% austenite at surface) reacts to tempering. It too bears out the point that as retained austenite at the surface is decreased, the larger will be the drop in hardness due to tempering. With only 10% retained austenite, the hardness loss at 0.0025 in. depth due to tempering at 350 F. is 3½ points Rockwell C in comparison with 5 points at 0.015 in. below the surface. This latter figure is in the region of peak hardness of the case where the microstructure showed martensite only. Here the carbon content at peak hardness is 0.83% corresponding fairly well with the carbon content of 0.90% for peek hardness of the case with 50% retained austenite at the surface.

Another installment of "Good Carburizing Practice" will be published in an early number.

Relationship Between Tempering Temperature and Case Hardness

STEEL: SAE 4615
TREATMENT: Direct quench in oil from 1700 F. Reheat to 1475 F. Quench in oil. Case depth 0.045 in. Tempered one hour at heat at temperatures shown

TEMPERING TEMP.	ROCKWELL HARDNESS
As quenched	C64.5
300 F.	C64.0
350 F.	C63.5
440 F.	C62.5
450 F.	C61.5
500 F.	C60.0
550 F.	C59.5
600 F.	C55.5
650 F.	C55.0
700 F.	C53.0
750 F.	C52.0
800 F.	C50.0



Vibrator feeders charge the roll-threaded screws onto belts in a special Surface Combustion radiant-tube hardening furnace. RX controlled-atmosphere has sufficient carbon potential to handle the skin-recovery treatment in 35 to 40 min. at 1420 to 1560 F

"Decarb" on Screw Products Yields to Controlled Atmosphere

Carbon depletion of normalized screw stock may extend 0.007 in. below the surface . . . Threads rolled on such material develop suitable properties if the hardening furnace has a carbon-restoring atmosphere

BY JOHN E. TSCHOPP, Metallurgist, THE CHICAGO SCREW CO.

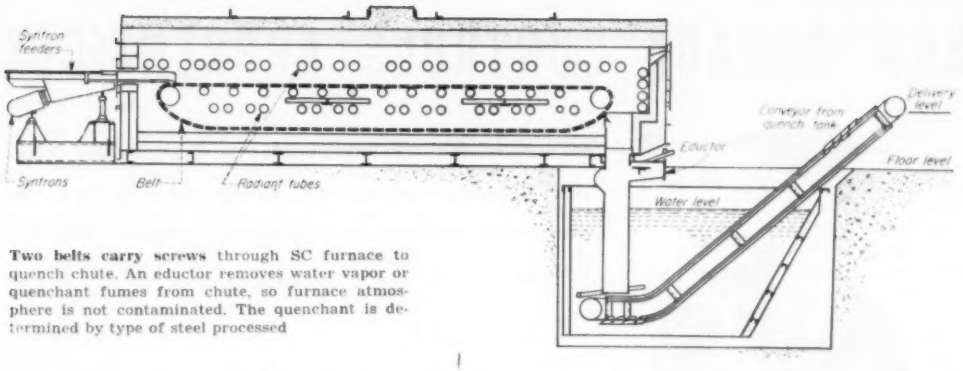
FOR some time, The Chicago Screw Co. in its new plant at Bellwood, Ill., has been supplying capscrews and bolts to customers requiring that these products be completely free from decarburization in order to meet special service conditions.

Various methods have been employed to provide screws and bolts free of decarburization. Cyaniding or carburizing have been found objectionable due to the high surface hardness and brittleness. Moreover, these methods are comparatively costly for such use.

Threading after heat treatment is still employed for special long bolts, where freedom from distortion as well as decarburization must be maintained. For general production, the threading of heat-treated stock is rather costly. Furthermore, the manufacturer often finds it economically advantageous to use thread rolling, but application of this process to heat-treated stock does not eliminate decarburization from the threads.

To produce capscrews and bolts free from "decarb" and still retain the economic advantages of thread rolling, the Chicago Screw Co. carried out tests in cooperation with Surface Combustion Corp. These tests demonstrated that, by properly controlling the hardening-furnace atmosphere, depleted surface carbon could be restored to roll-threaded capscrews and bolts made from normal decarburized steel stock.

Carbon restoration is handled by a specially built Surface Com-



Two belts carry screws through SC furnace to quench chute. An eductor removes water vapor or quenchant fumes from chute, so furnace atmosphere is not contaminated. The quenchant is determined by type of steel processed

bustion atmosphere furnace of radiant-tube type. These tubes normally burn 1000-Btu natural gas, but propane, coke-oven or mixed gas can be used. Screws and bolts are carried through the furnace on two 18-in.-wide belts of cast alloy steel. Belts are fed by two vibrator hearths.

At the discharge end of the furnace, the screws drop into a quench chute, pass through the quench tank on a conveyor, and are then elevated and delivered to tote boxes at above-floor level. This delivery location provides convenient handling through later operations such as tempering, followed by inspection and packing. Total time from feeder hearth to quench is approximately 70 min. Time at temperature ranges from 35 to 40 min. Temperature is held at 1420 to 1560 F, depending upon type of steel being treated.

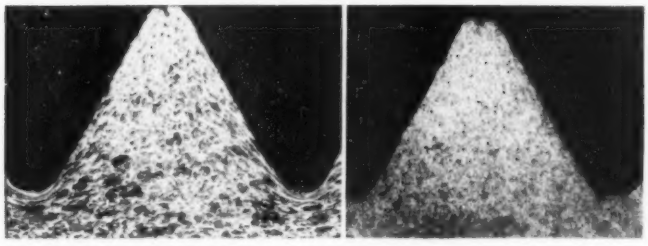
Oil, water and caustic-solution quenching are used in combination with various grades of steel to meet the different physical-property specifications required for the numerous types of capscrews and bolts produced in this plant.

The atmosphere is a "straight" RX gas, produced by Surface Combustion atmosphere generators. These also supply the atmosphere for other controlled-atmosphere furnaces in the heat-treating department. By "straight" gas is meant that no enrichment with methane is necessary to obtain the desired carbon potential for the skin-recovery treatment. Neither carbon dioxide (CO_2) nor water vapor are present in significant quantities, because the dewpoint of the atmosphere, as delivered from the generator, is maintained at approximately 15 F. Analysis of the atmosphere normally used is: CO—20.4%; H_2—40.2%; CH_4—0.4%, and N_2—39.0%.

Carbon potential of the atmosphere is controlled by the dewpoint of the gas in the furnace. Dewpoint checks are made at 2-hr intervals. As an additional control, test strips of steel shim stock are placed in the furnace and checked for increase in carbon content every 2 hr. As the majority of screws are made from steel of 0.35% carbon content, dew-point in the furnace is maintained at approximately 50 F. Maintaining this dewpoint has provided the carbon potential necessary to restore the carbon depleted surfaces even when they extend to a depth of 0.006 to 0.007 in. This condition is often found with cold-drawn, coiled steel stock.

Various types of steel are handled, hence oil, water and caustic-solution quenches are maintained. Proper control of furnace atmosphere, however, makes it essential to prevent contamination of the atmosphere by water vapor or fumes from the quenching medium. The design of the quench chute, therefore, proved important. The chute was developed by Surface Combustion especially for this furnace. Eductors are inserted in the chute to prevent vapor from entering the furnace.

Circulation of the quench medium at the rate of 750 gpm further assures the desired results. A caustic-solution quench, held at 150 F, plus strong agitation of the medium, is now employed for SAE 1035 and 1040 steel for screws over ½ in. dia, and oil at 400 F for smaller sizes. Current practice with SAE 8640 steel, regardless of screw diameter, is to oil quench after heating in an atmosphere furnace. All parts quenched are bright in color and free from traces of scale or oxide. This also helps to make a more saleable product.



Wear resistance and strength of hardened screws are improved by use of a carbon-restoration atmosphere. Left—Normal depletion of carbon at crest of thread rolled in decarburized steel stock. Right—Fully restored and refined structure after carbon restoration treatment and water quench

HOW CANADA CONTROLS APPRENTICES

Certificates of competency are issued to apprentices who have passed the examination for their trade

No longer reliant upon immigration to supply needed craftsmen, Canadian industry, with Government assistance, now provides its own reservoir through a well-planned apprentice training scheme

BY GABRIEL ROUSSEAU
TECHNICAL ADVISOR, APPRENTICESHIP BRANCH,
DEPT OF LABOUR, PROVINCE OF QUEBEC

INCREASING importance of Canada as an industrial nation is typified by the realistic approach now adopted to a sensible, well-regulated apprenticeship system. Each province has its own regulations, established by its own government, but the Dominion government sets aside funds to match the expenditures of each province, provided the various Apprentice Acts and Regulations conform to certain prescribed standards.

These standards require that apprenticeship be in a skilled trade requiring at least 4000 hr employment, that there be written indentures, a fixed scale of wages, a definite length of apprenticeship, administration by an Apprentice Board of the province, provincial registration and supervision, a schedule of practical training, and provision for technical class instruction. The ratio of apprentices must be set after consultation with both employers and organized labor, and there must be equal representation of employers and labor on apprentice boards or committees.

Dominion assistance is also available to apprentices in private industrial plans, provided these, too, conform to the same standards and are registered and approved by the province.

Expenditures to which this Dominion assistance may be applied include salaries of instructors; cost of materials, supplies and hand tools; purchase of equipment; rent of premises; purchase of correspondence courses; allowances to members of trade committees; salaries and traveling expenses of field supervisors; operating costs of special apprentice training centers; and — a particularly noteworthy point—weekly living allowances and traveling expenses to trainees in full-time classes.

The apprenticeship board or commission for each province usually consists of five or seven members, with equal representation of employers and labor and representatives of the Dept of Education and Labor. For guidance in making decisions, increasing use is being made of advisory committees from the various trades involved. They may be both local and provincial, and the method of appointment, like that of the apprenticeship board, varies with the different provinces.

Actual control of apprentices is effected through field supervisors, skilled craftsmen who visit each apprentice and check progress of his work and the efficiency of the training, conduct, and work performance. In addition, they deal with any difficulties and complaints, work with the trade committee, and cooperate with the actual instructors.

Under the terms of his indenture, an apprentice binds himself to attend all the prescribed classes, not to absent himself from work without permission, and not to waste or damage the property of the employer. Other clauses, such as an undertaking not to discuss information about the employer's business, are inserted according to the regulations of the various provinces. In Nova Scotia, for example, there is an obligation on the part of the employer to refund to

When this happens, the apprentice is legally obliged to resume full-time class work and is given half pay by the apprenticeship board

the apprentice any fees for technical class instruction, provided the attendance and performance of the student have been satisfactory.

If for any reason an employer finds it impossible to carry out the terms of the indenture, the apprentice may be transferred elsewhere. However, this sometimes creates a serious break in the training program while an effort is being made to find another employer, and in some provinces experiments have been made by which the apprentice is not indentured to an individual employer, but to the trade as a whole, or to the apprenticeship board. In some cases where the delay is protracted, the apprentice is legally obliged to report to the nearest center and resume full-time class work, for which he is paid at half the regular working rate.

Class Work Varies

The amount of classroom work again varies with the different provinces, and use is made of full-time classes lasting from one to three months each year; part-time classes for four to six hr per week; and correspondence courses—the latter particularly for apprentices in outlying districts where attendance at classes is not practicable. Full-time pay is commonly paid during the class work. Periodic examinations are held, and in some provinces a final examination must be passed before a certificate of proficiency is granted, classifying the holder as a journeyman.

In most provinces, when a trade has been officially designated as requiring apprenticeship, certificates of competency are issued to apprentices who pass an appropriate examination, and it is usually forbidden to employ non-certified journeymen.

In the province of Quebec the apprentice organization is different from that of the other provinces, although the effectiveness is about the same. It is based on the premise that an industry has the right to say how its workers should be trained, but also has the responsibility of seeing that the training is sufficient, not only to satisfy particular needs and guarantee a minimum wage, but broad enough to give the worker a certain pride and satisfaction in exercising his trade. Thus the objective is to provide industry with good mechanics, and society with good citizens.

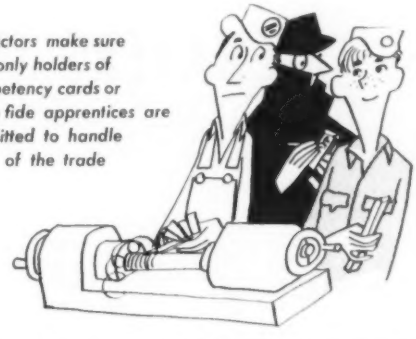
To this end, the province has instituted a Collective Agreement Act under which wages, hours of work, apprenticeship, and the ratio of apprentices to skilled workers in any given industry are clearly established. The agreement is administered by a parity committee made up of labor and management representatives for each industry. This body appoints the necessary inspectors, auditors, and other personnel, and has the power to levy a tax, not to exceed 1% of the wages; half of which is paid by the employers, and the other half by the employees. This money is used for administration of the committee and for apprenticeship.

In addition, there is in operation an Apprenticeship Assistance Act under which any suitable municipality may be recognized as the apprenticeship center of a trade, upon application of an association of employers and an association of workers. Ten or more persons may then be incorporated as an apprenticeship commission for that center, in cooperation with the Ministries of Labor, Health, and Youth and Social Welfare. The responsibilities of such a body include making agreements with schools, giving training courses to apprentices, and determining conditions of apprenticeship as regards length of the training program, provided this is approved by the parity committee concerned. Finances are provided by the Dep't of Labor and the parity committee.

Apprentice training is thus administered by management and labor jointly, with provincial officials acting in an advisory capacity. In most other provinces, it is administered by the government, assisted by advisory councils representing management and labor.

Quebec apprentices are not ordinarily indentured, but are registered with the Joint Committee, and small companies employ a large proportion of the boys. In provinces where the apprentice is indentured, it has been noted that only those employers who feel assured of a fairly large and continuing volume of work will enter into the agreements.

In many provinces, helpers are permitted to handle tools, and may thus pick up sufficient knowledge to be employed as journeymen without going through an apprenticeship. In Quebec, however, only those holding apprenticeship booklets or competency cards are permitted to handle tools of the trade, and in the Montreal area alone, 26 inspectors are engaged in enforcing this regulation.



Inspectors make sure that only holders of competency cards or bona fide apprentices are permitted to handle tools of the trade

Pre-employment courses are considered highly important because apprentices are thus enabled to receive continuous training with the tools of their trade, supplemented by theoretical instruction and recreational activities. Without it, the boys may be occupied in laboring tasks and are less likely to get a properly balanced training. Moreover, with training on the job, the instruction may be given by journeymen who have neither the ability, time nor inclination to pass on information. Whereas, with school training, instruction is from full-time instructors and is free from interruptions caused by weather, unemployment, or other reasons. Employers welcome graduates who are known to have a thorough basic training and have passed a trade test, and are freed

from the time and expense of training green boys, some of whom will be found unsuitable for the job. The length of total apprenticeship is shortened by the granting of credits for school work, which could be obtained otherwise only by night-school work. And although the apprentice on the job receives wages and those in school do not, the latter will attain journeymen rates in a much shorter time.

By getting off to a good start, apprentices who graduate from pre-employment courses are more likely to stay in their trade than those who may be discouraged by initial setbacks on the job. The parents also receive assurance that their boys will receive thorough training.

Thus far, only about 12% of the Quebec apprentices have received this pre-employment training of 6 to 12 months, but it is hoped to extend it to all in the near future. The schools are operated by the industry concerned, with some financial aid from the provincial government, and loans or grants may be made to needy boys by industry.

Private industry is permitted, and encouraged, to operate its own apprenticeship schemes, provided these comply with the minimum requirements established by the commission.

In Ontario, 25 employers or employees in a trade may petition to have that trade recognized as requiring apprentice training, and subject to the Apprenticeship Act. The regulations then established will be applicable to the entire province.

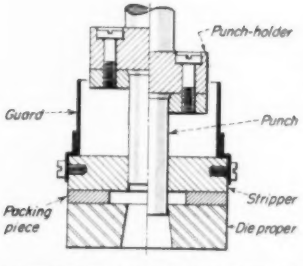
The regulations vary with each particular trade but, in general, provide for examinations and issuance of certificates, fix the rate of assessment of employer and employees, and generally govern the enrollment and training of apprentices. One particular feature is that an apprentice may be taken from his job for a certain period, and sent to a center where a trade school has been established. He is given transportation and a living allowance while at the school. This is particularly advantageous in small towns or rural areas as it permits concentration of the trade schools without penalizing those who live in remote areas.

All apprentices receive two months' class instruction during both first and second years at the Ryerson Technical Institute in Toronto. This school is operated and living allowances are paid to the boys by means of provincial and federal funds.

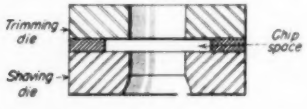
As in other provinces, private industry schemes are encouraged and assisted.

DIEMAKERS' KINKS

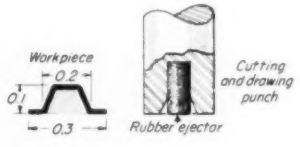
BY FEDERICO STRASSER



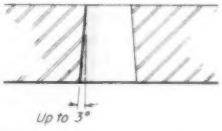
STATIONARY GUARDS of sheet or perforated metal add much safety to operation of press tools. In type of die shown, the guard is attached to the stripper.



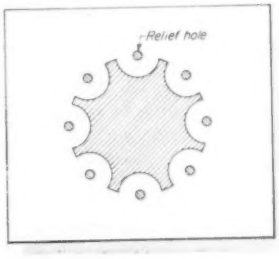
ONLY ONE PUNCH is required in a combination trimming and shaving die for drop forgings. The punch is made with dimensions corresponding to the shaving die. Forgings are placed on a nest upon the upper die plate, and the punch pushes them through the trimming die, then the shaving die.



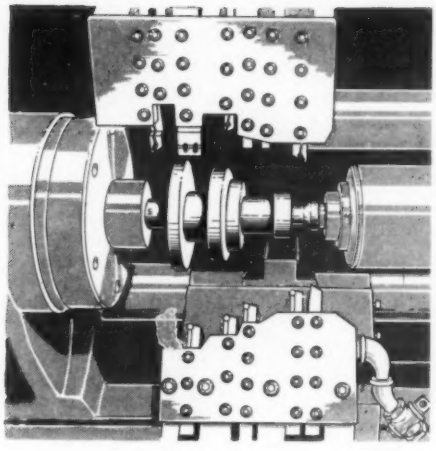
WORK EJECTORS made of rubber can be fitted to punches, when the usual spring-actuated or positive stripper can not be used for lack of space. Such ejectors are especially good when small, shallow parts are to be drawn with ample taper. The punch shown first blanks the piece, then draws it. The stamping is carried up with the punch and is stripped by expansion of the rubber insert.



COPPER is safely blanked or punched if the die opening is given greater clearance than is customary with steel, and the wall of the die opening is highly polished. Such treatment will avoid the danger of clogging the die opening in service.



HEAT-TREATMENT distortion is avoided if relief holes are drilled at the center of half-round projections into the cutting opening of a die. The narrow recesses should be radiused at the corners to prevent cracking if the product design will permit.



how to choose and use

AUTOMATIC LATHES

BY MILES J. ROWAN, ASSOCIATE EDITOR

GREATER output and lower costs are the main reasons for installing automatic equipment of any kind, and this is particularly true of automatic lathes. With an automatic lathe one man often can turn out two or three times the production possible with a hand-operated machine. Not only is he able to run two or more machines, but the cycle time on each machine frequently is much shorter than is possible on any other equipment suitable for the job. This results both from the elimination of manual effort from much of the cycle and from the basic tooling possibilities of the machine. Versatile, as well as fast, the automatic lathe is capable of performing a large number of operations. For turning, facing, and chamfering operations on multiple diameters on shafts, cluster gears, and similar work it provides extremely short cycles. Yet its possibilities for boring, contouring, and special setups should not be overlooked. The automatic lathe also should not be regarded simply as a high-production machine. Although it obviously is well-suited for long-run jobs, cost-reducing applications on medium and short-run work also are possible.

There is no official definition of an automatic lathe. However, the machines described here are single-spindle units that are specifically designated as automatic lathes by their manufacturers or have the same basic principles of operation as those machines. This report explains how they operate and what they can do. Later reports will be devoted to automatic turret and other lathes.

A SPECIAL American Machinist REPORT TO THE METALWORKING INDUSTRIES

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types of automatic lathes

Automatic lathes have tool positions at front and rear. Tools on machine above slide inward toward machine centerline to feed tools to depth of cut. On machine at right . . .

AUTOMATIC lathes may be operated either with or without a tailstock. When set up with a tailstock, they perform external operations on work held between centers and rotated by a workdriver or special fixture. Shafts, castings, and forgings can be machined, and turning, facing, grooving, and chamfering operations are those most commonly performed. Without a tailstock, the automatic lathe is operated as a single-spindle chucker. Boring, recessing, and other internal operations can be done. Machines also can be set up for taper-turning or boring, angular facing or grooving, and contour-turning or boring. Some of these operations require attachments; others do not. Likewise, operations that can be performed without an attachment on one machine may require an attachment when set up on the machine of a different manufacturer. However, all of the operations mentioned can be performed with standard equipment, and, with special tooling, many other operations also are possible.

Machines have front and rear tool positions which operate independently. Frequently, the front position provides longitudinal and transverse motion, or combinations of the two, while the rear position has transverse motion only. This is in accord with conventional tooling practice in which the front position is intended primarily for turning or boring and the rear for facing, grooving, and chamfering. However, attachments and auxiliary slides that permit additional motions at the rear position usually can be added when needed for a particular job. There also are several standard machines that provide both longitudinal and transverse motions in any direction at both front and rear positions. These lathes have complete independence as regards distance, direction, sequence, and rate of travel for tools at each position. Most machines also can be equipped with a vertical slide.

Machines of the above type are made in a number of different sizes each of which is intended for a certain range of work. The smallest machines swing work up to 8-in. diameter and hold pieces up to 15 in. between centers. The largest standard machines swing work up to 28-in. diameter and 144 in. long. Gap models also are produced and special machines for larger work have been built.

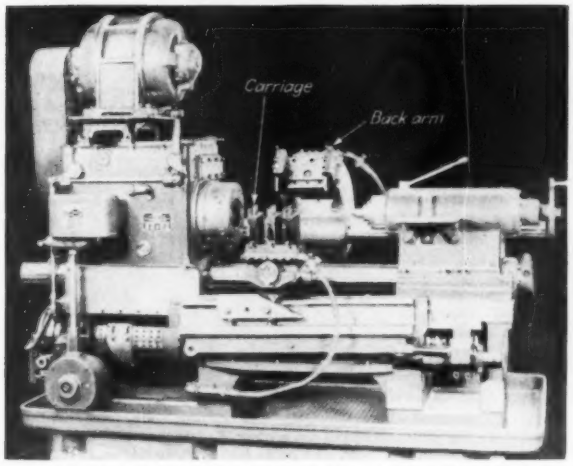
Single-spindle chucker

Similar as to many of the operations that it can perform, yet quite different in appearance from the equipment just described, is a single-spindle chucker that swings work up to 12-in. dia, yet has an over-all length of only 64 in. On this machine, the operating position is directly in front of the chuck rather than at the side. All control levers, as well as a pedal controlling an air chuck, can be operated from this position.

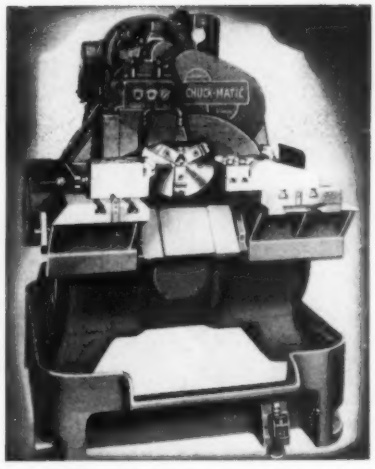
The right-hand slide is a compound slide that carries holders and tools for straight or taper boring, form boring, form turning and drilling. The lower member, or main slide, moves crosswise toward the spindle; the upper slide travels toward the face of the chuck. The left-hand slide moves only crosswise toward the spindle and is for operations such as forming, facing, grooving, and chamfering.

Machines with platen slide

Adaptable to a wide variety of work is the automatic lathe with platen table. One machine in this category has a large flat table on which two or more independent slides can be mounted at any angle to the work. When the cycle starts, the platen table advances to the working position and the slides then feed the tools into the work. When cutting is completed, the



. . . tools rock inward to depth, pivoting about bar on which carriage and back arm are mounted. All machines employ some form of these two basic methods for moving tools across the machine. Tools also can move in longitudinal and angular direction

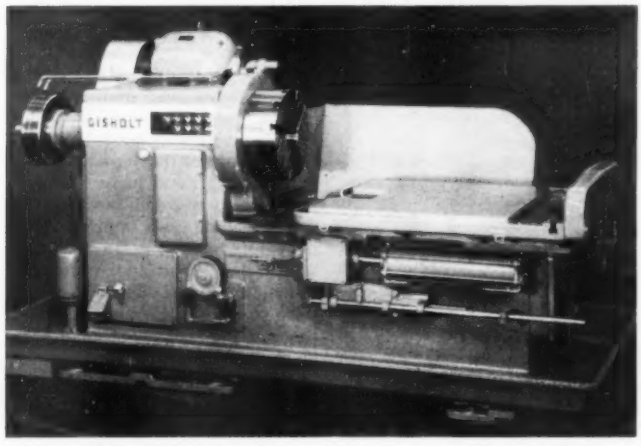


Single-spindle chucker has over-all length of only 64 in. and is operated from position directly in front of chuck. Slide on right provides longitudinal, transverse, or angular motion

slides retract, the platen moves back for unloading, and the spindle stops.

These machines can be operated as chuckers or, with a tailstock, mounted on the platen, as between-center machines. In addition, as toolslides can be placed to suit the operational requirements of the work, these lathes are readily adapted to special or unusual jobs. For example, simultaneous machining on both ends of parts such as motor frames can be arranged. Or power-driven tools, such as drills or turning tools, can be mounted on the machine centerline so turning and boring can be done at the same time, yet each tool can operate at the correct surface speed for its operation.

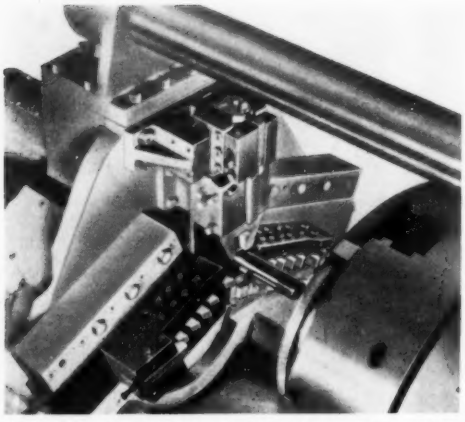
A second machine in this group has a platen slide mounted on ways on the bed in place of the carriage. One type has a platen that carries a multiple-tooled boring head, which in combination with a rear tool position makes an excellent setup for brake drums and similar parts. Another type has a vertical head with a tool-mounting surface vertical to the ways of the machine. Toolslides can be located on this surface to perform facing and grooving operations longitudinally and radially to the work. After the head advances to the working position, the slides move in the vertical plane toward the centerline of the work. A second tooling method on this machine is to mount fixed toolbits in a holder on the vertical surface and plunge cut the work. The head moves into position, then feeds in to make the cuts. Feed can be changed and tools can dwell to suit the job being run. Both grooving and facing operations can be done.



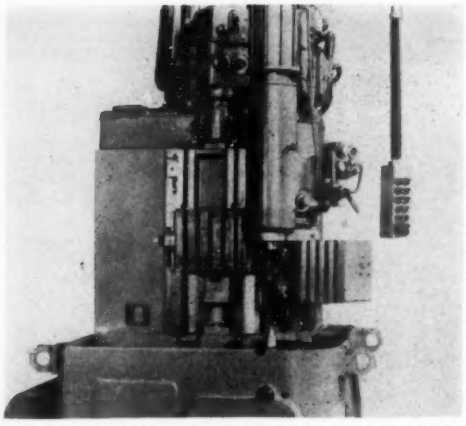
Platen machine has large flat table on which independent slides can be mounted in any position. Platen table advances to working position, toolslides then operate to feed tools during cut. After cut, slides retract

With automatic workhandling

Fully automatic workhandling as well as machining is provided on a standard machine that feeds work from a magazine at the rear position and performs turning, chamfering, tapering, or contouring operations with tools at the front position. Necking also can be done with an attachment

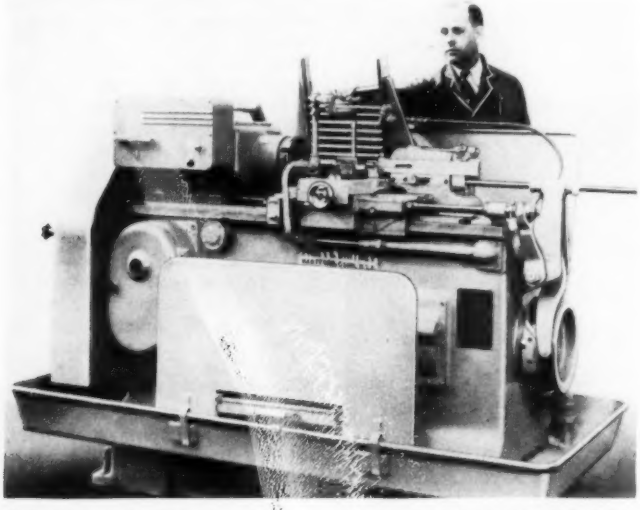


Vertical-head machine has tool mounting-surface vertical to machine ways. Tools can be set up in movable slides, as shown, or in fixed position for plunge cutting. In latter method, vertical head provides feed motion



Vertical automatic lathe has turning slide, left, and facing slide arranged to swivel. Tailstock can be replaced with boring head and extra slide can be added, as well as attachments for taper turning and other work

mounted at the rear position. Work is held between centers and, as long as there are pieces in the magazine, all operations are automatic. The machine places the work between centers, adjusts and clamps the footstock, grips the work, goes through its cutting cycle, and then delivers the finished part to the work pan. Parts from $\frac{1}{2}$- to $1\frac{3}{8}$-in. diameter and from $2\frac{1}{2}$ to 18 in. long can be handled on the standard machine. Although this lathe is primarily a single-purpose machine that usually is set up for a given job by the manufacturer, it is possible to equip the machine so other jobs can be done. It also should be noted that the machines first described can be tooled for magazine feed.



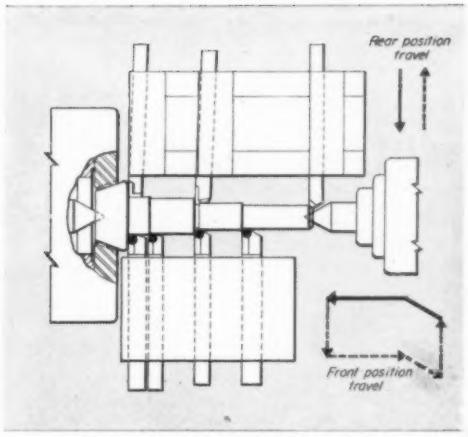
Fully automatic lathe performs turning and other operations on work held between centers. One or more tools are mounted on front position and work feeds from magazine at rear position. Workdriver automatically grips, drives, and releases work, and footstock also operates automatically. Only loading of magazine and normal tool maintenance are necessary

In general, the design features of automatic lathes suit them for a wide variety of applications. Castings, forgings, stampings, and cut-to-length bar stock can be machined and the range of speeds and feeds available is sufficient to provide recommended surface speeds for practically all common materials and for all tool materials, including carbides. The freedom that is afforded in arranging the motion of tool positions permits setting up for parts of many different sizes and shapes and for jobs and operations requiring many different tool actions.

Setup Is Easier Now

Power provided is sufficient to meet the demands of high-volume metal removal with multiple toolbits. Cycles are automatic and include rapid traverse motions. Cycles thus are shorter and operators often can run more than one machine. In addition, modern machines include many improvements in features affecting the details of setup such that the automatic lathe often can be applied to short-run as well as long-run work. Thus, the smaller shop, or shop with lower production quantities, can no more afford to overlook the possibilities of the automatic lathe than can the large mass-production industries in which machines of this type have been applied successfully for a number of years.

how do automatic lathes operate?



Automatic cycle moves tools over motion path established during setup to suit job. Cycle consists of high-speed movements, dotted lines, and feed movements, heavy lines. High-speed cycle minimizes non-productive time of machine and shortens over-all time of job

AUTOMATIC lathes minimize time-consuming manual operations. On machines with automatic workloaders, the operator has only to keep pieces in the magazine. On those without workloaders, he must perform a few additional operations: open the chuck, unload one piece and load a second, close the chuck, and start the cycle. All other operations are fully automatic.

When the operator starts the cycle, tools advance at rapid traverse to a point just short of where the cut is to begin. The machine then shifts to the correct feed rate for the operation. When the feed stroke is completed, the machine shifts back to its high-speed cycle and at rapid traverse returns the tools to the starting point. As all advance and return motions of the tools are performed at high speed, with traverse rates as high as 250 ipm on some machines, the total time of the automatic cycle is but a few seconds more than the time required for feeding the tools across the work.

Other cycle features

On some machines, the basic cycle also includes a momentary pause for tools to clean up at the end of the cut. Tool relief also may be provided so tools will not score the work as they return to the starting position. Another feature on one machine makes it possible for tools to advance at rapid traverse, feed, return again to rapid traverse, then shift a second time to feed, and finally return to rapid traverse. This cannot be done, however, while facing at the rear position.

The path over which the tools travel is set up to suit the requirements of the job. This is a distinctive feature of the automatic lathe; on most automatics on which turning operations are performed, tools travel over fixed paths. However, on the automatic lathe, tools travel over a different-shape path for different operations and may even follow a different path for the same operation on different jobs. As longitudinal and transverse motions of the tools can be controlled independently, a large number of motion paths can be arranged and a wide variety of tooling requirements can be met. Typical paths, or cycles, are explained for each operation. In setting up automatic lathes, the motion path for each tool position is arranged individually. The two positions then are timed to operate in correct relation to one another.

Speeds and feeds

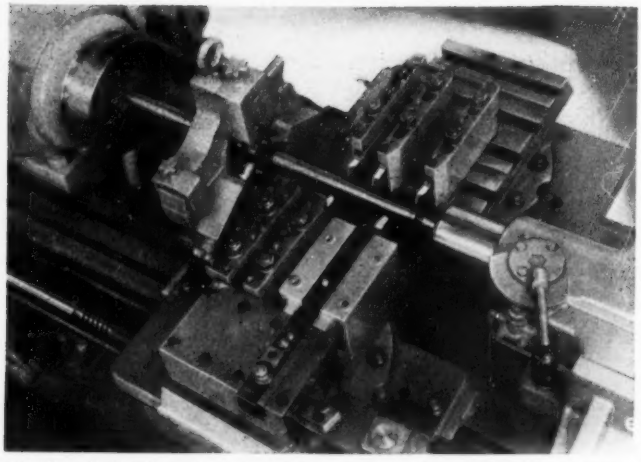
All machines have a wide range of speeds and feeds available. On some, speed and feed, once selected, are constant during the machining part of the cycle; on others one speed change can be made automatically during a cut; and still others permit changing both speed and feed during the machining cycle.

Single-point tools are employed for most cuts, but form tools also can be used. Most machines are powered for carbides, with motors running to 75, 100, and even as high as 175 hp. Both the brazed and the mechanically held carbide toolbits are used, as well as HSS and cast-alloy tools.

Toolholders

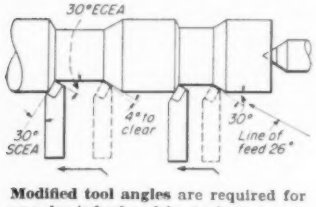
Tools are mounted in standard toolblocks where possible. However, special blocks holding as many as 8 or 10 tools are made when toolbits must be grouped together more closely than is possible with standard blocks or when tools must approach from a particular angle to reach the surface without interference and with the proper clearances. When tools approach at an angle to the work, tool angles must be modified according to the approach angle to provide the necessary clearances for free cutting.

One of the most important points in tooling is the method of holding and driving the work. In general, between-center work is supported either in its own centers or on a mandrel which is held between centers. The 60°-included-angle center usually is employed for work up to approximately 2-in. dia.

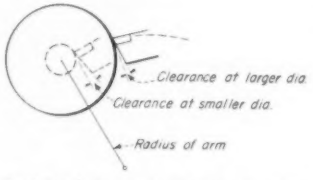


Standard toolblocks hold facing tools at rear position. Block in foreground on front carriage is for taper turning. Toolblocks by other manufacturers will vary somewhat. Steady rest aids in supporting long piece between center in pneumatic tailstock and in two-jaw driver

Inserted carbide toolbits can be changed without removing holder, thus minimizing time of tool change. Bits can be ground on three sides at each end, providing six cutting edges per toolbit. Other shapes also are used. Kit on carriage contains nine toolbits pre-ground for quick changing



Modified tool angles are required for angular infeed and for tools that rock in to diameter. End and side cutting edge angles are increased according to the angle at which the machine feeds tools to work. Front clearance angle on tools that rock are ground for minimum clearance at largest diameter to avoid excessive clearance at smallest diameter



while the pipe center is used for open-center pieces of large diameter. On both types, location is determined by the position of the work on the center. Thus, the piece must be faced to length accurately and centered to a definite depth on the locating end. If the work must be turned end-for-end for a second operation, the center depth must be held on both ends. Plug centers are for those pieces which must be supported from a straight bore. In this case, the bore size must be held very close to the plug size. Location is in the jaws of the driver and the end of the work is faced prior to the lathe operation. Other methods of support include mandrels on which the work is pressed, air-operated expanding mandrels, and a variety of workholding devices designed to meet the requirements of a given piece.

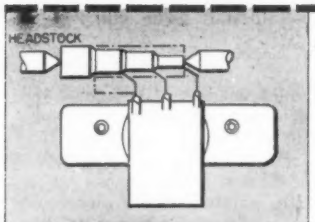
Workholding methods

Headstock centers fit a taper in the workdriver or machine spindle and rotate with them. Any type of center with correct taper can be inserted. Work is rotated with drivers or chucks, which may be mechanical, pneumatic, or hydraulic. One type of mechanical driver exerts equalized pressure and automatically adjusts to apply whatever pressure is required for the amount of metal being removed. The harder the pull, the tighter the grip. Another method of holding work is the power-actuated 3-jaw chuck. Jaws can be hard, soft, or of special shape to suit the work. Numerous other types also are employed, including compensating jaw, pin type, pot chucks, vacuum chucking fixtures, and special workholding devices for special shapes.

With power-actuated chucks, pressure can be preset and controlled by regulators. The amount of gripping pressure depends upon such factors as the material, its hardness, speeds, feeds, depths of cuts, number of tools in action, and the size and weight of the piece.

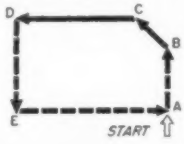
Tailstocks also can be mechanical, hydraulic, or pneumatic. Automatic tailstocks are preset to exert just enough pressure to hold the piece on the center against the thrust of the tools.

AUTOMATIC LATHE TOOLS TRAVEL MANY MOTION PATHS . . .



...TURNING WITH ANGULAR INFEED AND MULTIPLE TOOLS

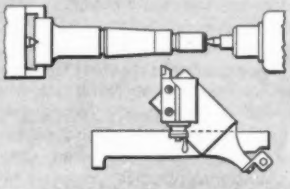
MOTION PATH



CYCLE BREAKDOWN

A-B *ADVANCE: Rapid traverse*
B-C *ANGULAR INFEED*
C-D *FEED: Longitudinal*
D *DWELL*
D-E, E-A *RETURN: Rapid traverse*

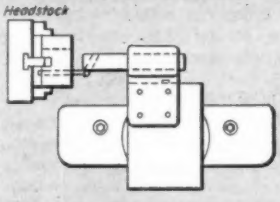
ALTERNATE PATHS



...TURNING WITH ANGULAR INFEED AND SINGLE TOOL

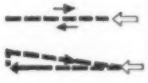
MOTION PATH

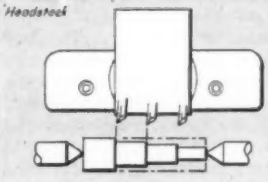
A-B *ADVANCE: Approach rate*
B-C *FEED: Longitudinal and transverse*
C-A *RETURN: Rapid traverse*



...STRAIGHT BORING

A-B, B-C *ADVANCE: Rapid traverse*
C-D *FEED: Longitudinal*
D *DWELL*
D-E, E-A *RETURN: Rapid traverse*

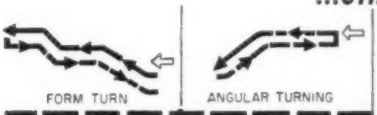


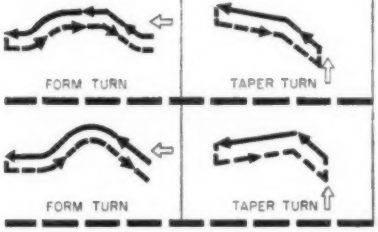


...STRAIGHT FACING

A-B *ADVANCE: Rapid traverse*
B-C *FEED: transverse*
C *DWELL*
C-A *RETURN: Rapid traverse (Over same path as advance)*

...OTHER CYCLES



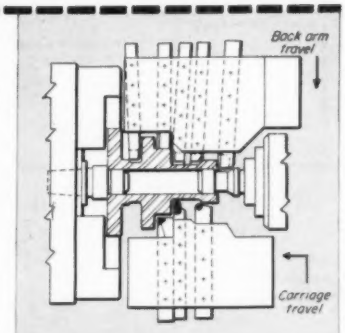


Motion paths over which tools travel are arranged for the operation being performed. Tool relief also can be arranged for almost any sequence of operation. All of the above paths may not be obtainable on every lathe, as control characteristics differ among machines by different manufacturers. Likewise, not all of the possible paths of tool travel are shown. However, the majority of the paths can be obtained through the standard setup features of the machines plus standard attachments. This affords considerable flexibility in setup, and, combined with speed, feed, and tooling possibilities, provides a versatile machine capable of meeting a wide variety of cutting requirements

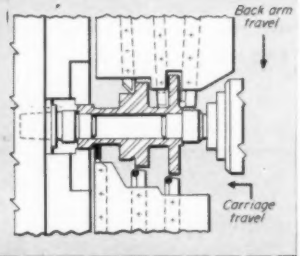
what operations

Some Jobs Are Set Up With Multiple Tooling . . .

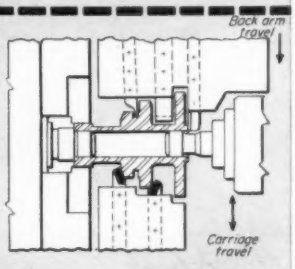
1 ROUGH TURN—face & form
(first end)
Workholding: Stub Centers
Workdriving: 2-Jaw Compensating Air Chuck
Depth of cut: ¼" on a side, ave.
Turning speed: 450 FPM—Feed 0.015
Facing speed: 580 FPM—Feed 0.020
Power required: 68 hp, approx.
Time: 24 sec



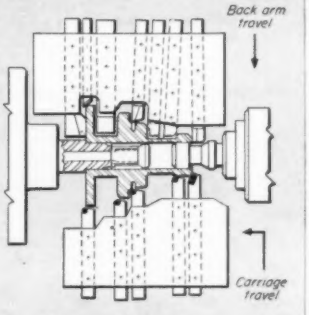
2 TURN—face & form
(second end)
Workdriving: } same as
Workholding: } first operation
Turning speed: 520 FPM—Feed 0.017
Facing speed: 520 FPM—Feed 0.025
Power required: 35 hp, approx.
Time: 28 sec



3 FORM GROOVE-face-chamfer
(second end)
Workholding: } same as
Workdriving: } first operation
Speed: 470 FPM
Feed: 0.0075
Power required: 28 hp, approx.
Time: 18 sec



4 FINISH TURN—face & form
(complete)
Workholding: } Air-operated
Workdriving: } expanding fixture
All diameters that must be concentric with one another and must run true with the locating surfaces are machined in this operation.
Turning speed: 660 FPM—Feed 0.013
Facing speed: 660 FPM—Feed 0.025
Power required: 20 hp, approx.
Time: 23 sec



TURNING is one of the most important operations on an automatic lathe. Straight, taper, and form turning all can be done and at speeds that are among the highest in the country today. Ford recently was reported as running an automatic-lathe job in which one critical tool operates at an average cutting speed of 825 fpm (AM-Nov. 27, 1950—p 123). And an article in this issue describes what General Motors has done to make possible speeds as high as 990 fpm on an automatic-lathe job. These setups are exceptional, but, even with conventional practice, probably no other single-spindle machine in use today can better the performance of an automatic lathe on multiple-diameter work.

Turning methods

There actually are two basic methods of turning on these machines. And there is at least one or more variations on each method. The first method is to mount multiple toolbits at the turning position with at least one tool for each diameter on the piece. The feed stroke of the slide then must equal the longest single cut on the work. The feed rate is determined largely by the finish required on the work. If any one surface requires an extra good finish, all other tools must be fed at the rate that produces this finish. Speed is determined by the largest diameter that must be machined. However, as six or eight surfaces often can be machined simultaneously, the total time to turn an entire piece usually is surprisingly low.

Tooling on truck-transmission cluster gear combines deep shoulder facing, forming, and grooving cuts with heavy turning cuts at high surface speed and substantial feeds. Automatic lathes, adequately powered for carbides and for removal of large volumes of metal at one time, excel on multi-diameter external machining operations and also can be applied profitably to numerous boring operations

can be performed?

. . . Some Are Planned For Single Tool Turning

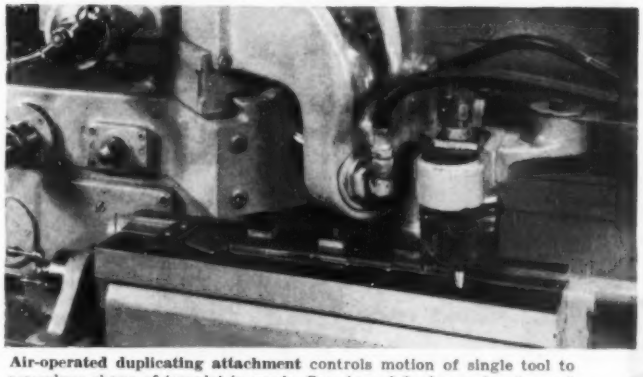
The second method of turning is with a single tool controlled by an air-operated duplicating attachment. The tracer follows a templet of the contour to be turned and, as it travels, variations in the shape of the templet cause a greater or smaller volume of air to escape through a pilot valve in the tracer head. This varies the pressure within the pneumatic system and actuates a hydraulic system that controls the toolslide movement. In this way, variations in the shape of the templet are translated into in-and-out movements of the toolslide and the shape of the templet is duplicated in the work. With this method, speeds and feeds can be changed to establish conditions for maximum cutting efficiency as the tool moves from one surface to another. For example, in going from a small to a large diameter, speed can be reduced. Or, if two bearing surfaces on a shaft are the only surfaces requiring a fine finish, tools can be fed slowly on the bearing surfaces, then stepped up for the remainder of the cuts. In a single cycle, as many as five feed changes and one speed change can be made.

However, there are certain limitations on the work that can be produced by the tracer-controlled machine. In general, it can turn all parts with constantly increasing tapers or contours as well as all parts with contours or tapers that decrease at an angle of not more than 30°.

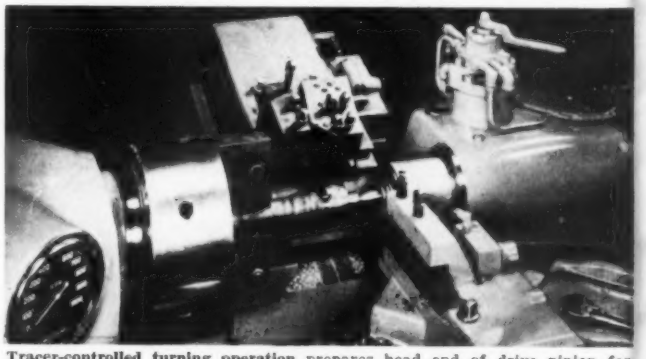
Turning practice

In multiple-tool turning, each toolbit passes across the work only once in the usual cycle. On many jobs, tooling is planned for rough and finish cuts in separate setups. These can be in two different machines if production warrants, but, if not, one machine can be changed over periodically. The roughing cut generally hogs off the bulk of the material and is run as fast as the job and machine permit.

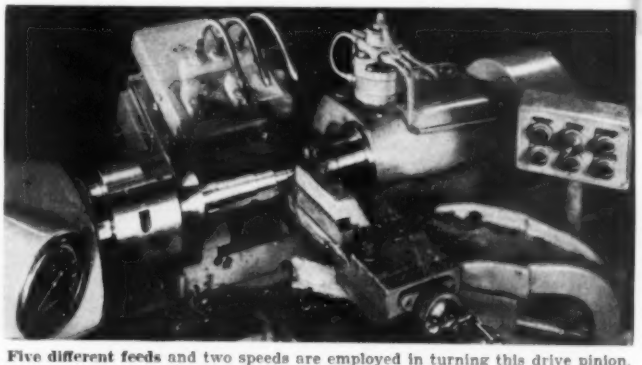
However, in some cases, it is



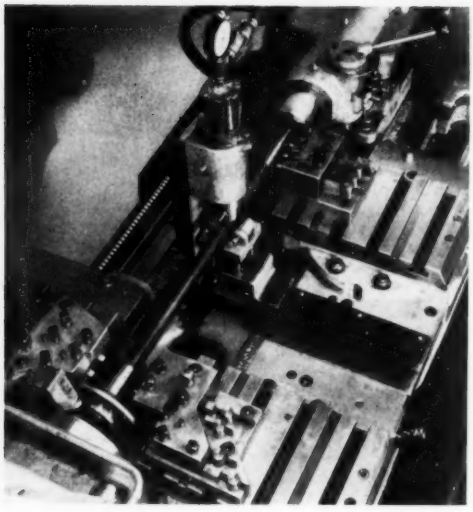
Air-operated duplicating attachment controls motion of single tool to reproduce shape of templet in work. Speeds and feeds can be changed during cut, and rough and finish cuts can be taken in one setup

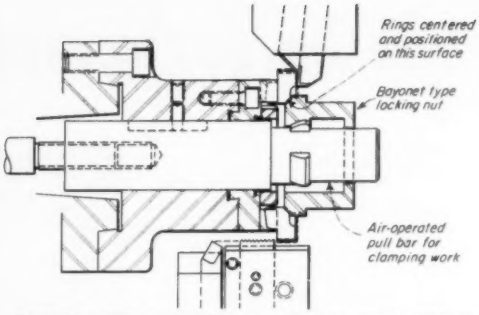


Tracer-controlled turning operation prepares head end of drive pinion for grinding. Facing is performed with multiple tools at rear position. Stem end is rough and finish turned with single tool in next setup. Total machining time for both ends is 1.31 minutes. Material is 4617 steel



Five different feeds and two speeds are employed in turning this drive pinion. Work speed automatically cuts in half as tool reaches inside face of head. Material is 8620 steel and total machining time per piece is 0.62 minutes





Threading follows turning operation on front slide of specially cammed machine. Carriage feeds at one rate for turning, then changes to correct rate for number of threads per inch required on OD of ring

Double carriages are employed at front position in turning and facing both ends of automotive rear axle in one operation. Air-operated snubber acts as steadyrest but must have spring platform and air cylinder to ride on rough forged diameter

possible to rough turn with a tailstock turning attachment and finish with a carriage tool, all in the same cycle. Likewise, automatic air-indexed heads for supporting a single tool can be arranged to take a rough and then a finish cut in one continuous cycle. Furthermore, if the operator is running only one machine on short-cycle work, a turret toolblock can be mounted on the front slide and after one pass the operator can index to bring finishing tools into position for a second finishing pass across the work. Roughing and finishing also can be accomplished in one cycle by leading with a roughing tool and following with a finishing tool, with both tools mounted in the same toolblock.

With the single-tool method, roughing and finishing in one cycle can be performed readily by employing an attachment. A roughing cut is taken across that section which has too much stock to be removed in one cut and a finishing cut then is made across the complete section to be turned. This is done with two templets. When the tool reaches the end of its roughing cut, it returns to the start position. During this traverse, the roughing templet indexes out of the way and a finishing templet indexes into position.

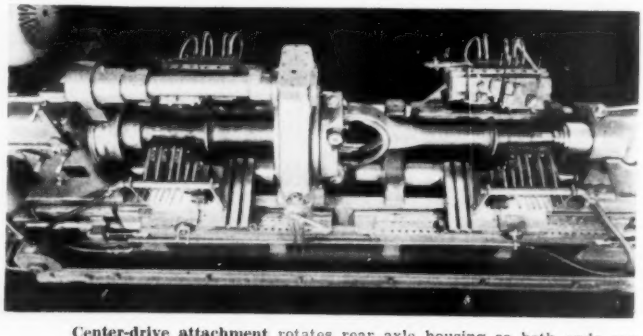
Both the multiple-tool method and the single-tool tracer-controlled method have established remarkable records in production. Advantages for each method can be stated by its advocates. Probably the safest procedure, therefore, is to check each job to determine which method is best suited to its particular requirements and to the conditions of the shop in which the job is to run.

Turning cycle

The conventional cycle for multiple-tool turning when HSS tools are employed is a rectangle, triangle, or a modification of these basic shapes depending upon the control characteristics of the machine. With carbides, however, the path usually is modified to provide an angular approach of the tools to the work. Known as angular infeed, this feature provides freer cutting as the tool feeds to the depth of cut. It also permits a gradual loading of the tool and reduces the danger of chipping or cracking the carbide.

Angular infeed consists of a simultaneous longitudinal and transverse motion of the tools. It begins as the machine shifts to its feed stroke and continues until the tools reach the depth for the cut. With angular infeed, tool angles must be modified in accordance with the angle of approach to provide the necessary clearance for free cutting.

Typical turning cycles are



Center-drive attachment rotates rear axle housing so both ends can be machined simultaneously. Work is held on centers and drive provides additional support. Both front carriages feed toward drive

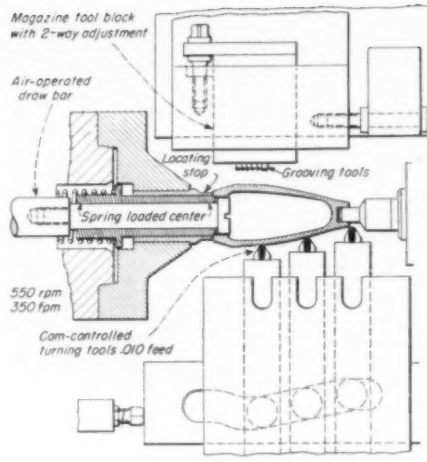
shown on the preceding pages. In the one at top center, the tool traverses rapidly from the start position to the point at which the feed stroke begins. Simultaneous longitudinal and transverse motion takes place during angular infeed. When the tool reaches cutting depth, transverse motion halts, and the tool travels longitudinally toward the headstock to make the cut. When turning is completed, the machine shifts to high speed and the tool traverse rapidly to the maximum back position, then longitudinally to the start position. This cycle also includes a dwell for the tools to clean up at the end of the cut. Another cycle, at right, is the same except that no dwell is provided, and there is simultaneous transverse and longitudinal motion during the rapid traverse return to the start position. The second cycle in the center column is for a tracer-controlled tool. In this cycle, longitudinal and transverse tool motions are made separately or simultaneously during the feed stroke as required to produce the desired shape in the work.

Form and taper turning

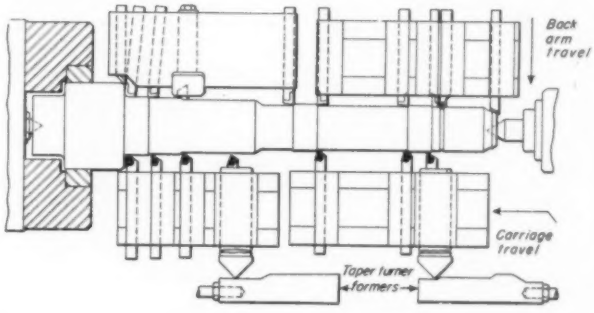
All automatic lathes can be set up for form and taper turning. On machines equipped with the air-controlled duplicating attachment, it is only necessary to provide a templet of the correct shape for the work. Likewise, on some machines, limited taper turning is possible through the standard setup features of the machine. However, if the taper cannot be obtained otherwise, a taper attachment can be added.

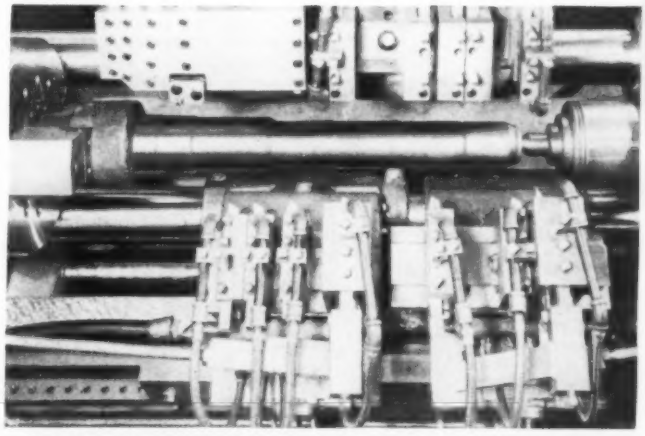
If the machine has a toolslide that can move crosswise independently of the carriage travel, it is only necessary to attach a cam bar, or former, of the desired shape to the machine. The bar then controls the transverse of the slide as the carriage moves along the work. In this case, all tools on the slide must turn the same taper.

However, if it is desirable for some tools to turn tapers at the same time that other tools are turning straight diameters, a different setup can be made. This second method also is employed on those machines on which there is

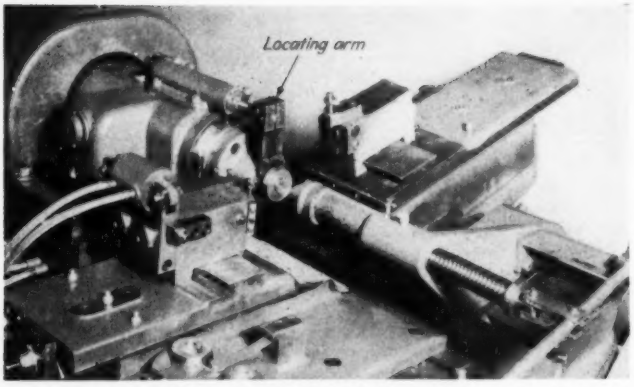


Taper-turning setup on front slide finish-turns OD of 61-mm HE mortar shell while tools on rear slide cut bourrelet grooves. Cam track controls transverse motion of toolbits as carriage moves toward headstock. Work screws on threaded stud connected to drawbar, centers on spring-loaded sleeve as drawbar moves back, and locates against locating stop

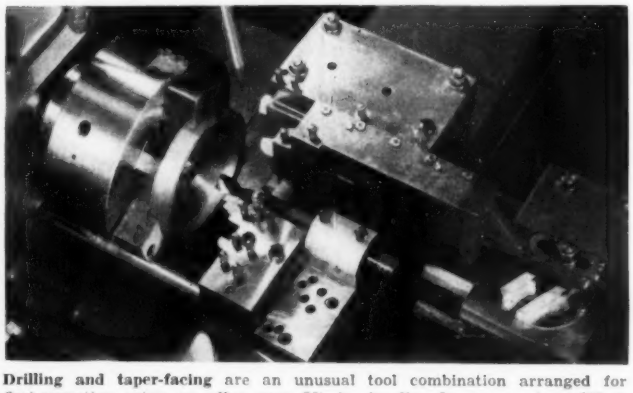




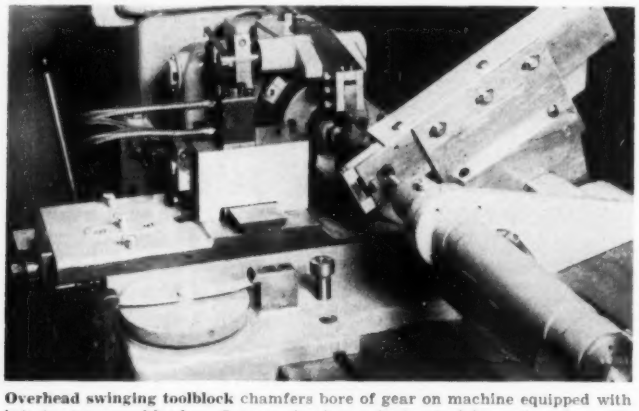
Straight and taper turning are combined in first operation on 34-in. pinion shaft of NE 8645 steel. Formers control transverse motion of taper-turning tools. Stock removal varies from ⅛ to ⅜ in. on a side. With 0.010-in. feed and speed of 205 fpm, approximately 45 hp is required



Hand-operated mechanical workloader permits headstock to run continually for turning and facing both sides of bronze disk. Operator preloads disk, then pushes it on air-operated mandrel where it is positioned by locating arm, which then moves back automatically to provide tool clearance. Tool at rear forms OD; facing tools at front position are mounted in relieving toolblocks



Drilling and taper-facing are an unusual tool combination arranged for first-operation setup on alloy gear 9¾ in. in dia. In same setup, OD is partially rough-turned, rim rough-faced, and hub rough-turned and faced



Overhead swinging toolblock chamfers bore of gear on machine equipped with injector-type workloader. Cam mechanism actuates tool in conjunction with front slide. Collet chuck is air-operated and operation is fully automatic

no relative motion between the tools and the carriage during the turning cycle. The principle is to use a toolblock in which the toolbit is free to slide back and forth at right angles to the centerline of the work. A former, or cam bar, then is attached to the machine to control the movable toolbits as the carriage travels longitudinally along the work. These attachments also can turn profiles and in some cases different diameters consecutively with the same tool. Tool relief can be provided on the cam bar and angular infeed also can be arranged.

Turning at the rear position

Although the rear tooling position is intended primarily for facing operations, it also is possible on some equipment to perform turning operations at this position. For example, several diameters can be turned at the front position with tools moving toward the headstock and at the same time rear tools can be turning other diameters with tools traveling toward the tailstock. Both positions also can travel in the same direction.

Facing, grooving, and chamfering

Facing, grooving, and chamfering operations are found on the vast majority of lathe jobs and are operations for which the automatic lathe is particularly well-suited. Tools can be set up in multiple, often to machine as many as six or eight surfaces simultaneously. For example, straddle facing, followed by chamfering or radii tools, is a common tool combination. And, with the proper toolblock, two facing tools can be set up to operate simultaneously at different positions on the same plane surface. In many cases, these operations require little or no additional time over that required for the turning operations.

Facing generally is performed from the rear tool position with a simple in-and-out motion. The tools first traverse forward rapidly, then advance at the feed rate, and, after the cut is finished, traverse rapidly back to the start position over the same path on which they advanced. On most machines, however, the tools can be relieved, if necessary, to avoid scoring the

work on the return traverse. This can be done, in some cases, through standard setup features of the machine; in others, through special relieving toolblocks. Several other variations of this basic facing cycle are possible to meet requirements of particular jobs.

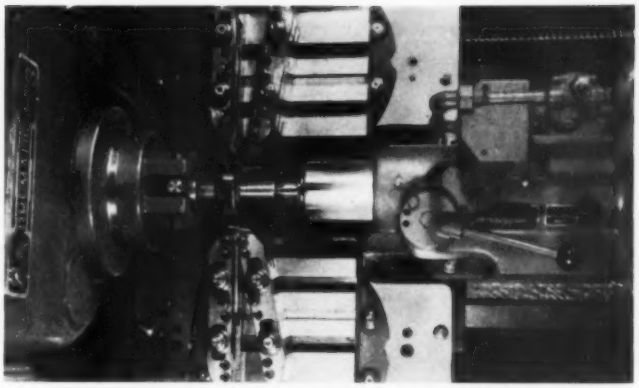
During facing operations, it often is desirable to change spindle speed as the tool moves from the outer surface of the piece to an appreciably smaller diameter. To meet this need, provision can be made on most machines for one automatic change of spindle speed.

Angular facing and grooving also are possible. One way in which these operations can be done is to position the toolslide at the required angle and feed to depth. Actually, only one manufacturer produces a standard machine equipped with toolslides that can be swivelled at any angle to the carriage. However, a second manufacturer has machines on which slides can be mounted in any position for angular in-and-out motions only. This company also can furnish swiveling slides on request. A third lathe builder can face angular surfaces up to 30° by an attachment that controls the motion path of tools at the rear position. Guides having the same shape as the surface to be faced are employed. With special guides to suit, some curved surfaces can be machined and combined straight and angular facing cuts can be made.

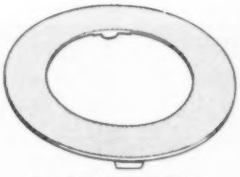
Boring

Boring also can be done on the automatic lathe and both straight and taper cuts can be taken. For these operations the tailstock normally is removed, the work is chucked, and a toolblock designed to hold the boring bar is attached. Both roughing and finishing tools can be mounted in the bar. The cycle or motion path usually is rectangular or triangular with the direction of the transverse motions opposite to those for turning.

Multiple diameters can be bored with two or more tools in the bar. It also is possible on some machines to mount a facing tool in the boring bar and to perform a facing operation on the side of the piece that is next to the chuck. Another tooling trick that may permit complet-

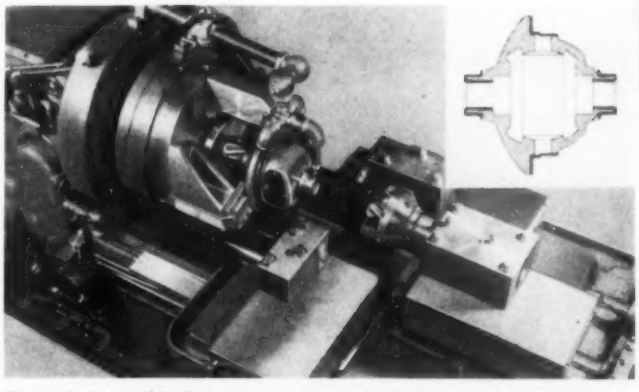


Facing and forming of irregular shaped, cast-iron clutch is performed with work supported on special mandrel between centers. Special driver rotates work through pins of mandrel

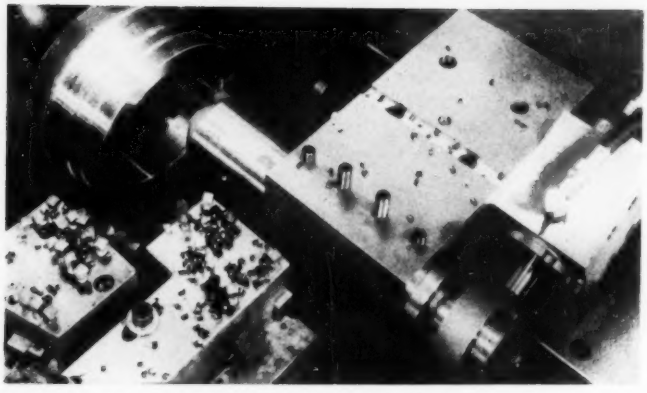


Face–Turn OD and chamfer–chamfer ID

Short-bed lathe has two tools on rear slide that rough-face clutch plate at feed of 0.035 ipr. As one tool is set 0.035 in. ahead of second, approx. 0.070-in. cut is made per revolution. Finish-facing is done with single tool on overhead slide. Work is unloaded automatically

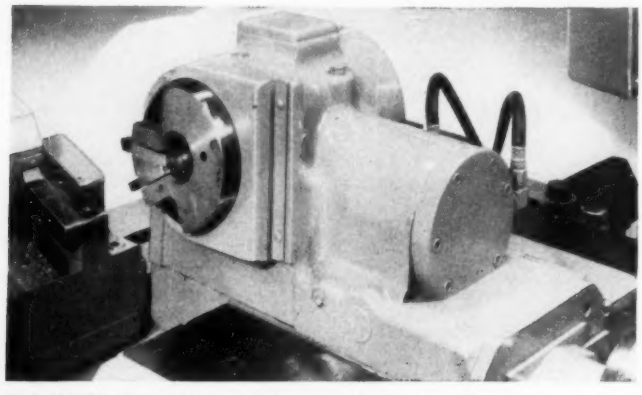


Two ends are machined at once with identical tooling on both standard centerslide and back-boring attachment that feeds through spindle. As these two sets of tools move together, both hubs of differential carrier are bored, faced, and turned in single chucking. Conventional tooling on front and rear slides turns two diameters and faces the outer flange



Boring setup has special attachment that rotates bar at end of cut so tool clears work. Slide also swivels and can be set up for taper boring, turning, or angular facing

Rough and finish boring in one setup is performed with two-station, air-indexed boring bar. After roughing cut, bar indexes to bring finishing tool into position, speed increases, feed decreases, and carriage feeds out for finishing cut



Air-indexed boring head also can be set up for turning. Cycle is same as for boring. For machining bearings, one machine can be set up for boring and facing, and a second for turning and facing

ing a piece in one chucking is to mount a boring tool in the spindle for back boring and facing operations on surfaces that cannot be reached from the carriage. Piloted boring bars steady the cut and also can be made to carry a cam that actuates the tools in the spindle.

Machines that are intended for high-production boring operations on such items as bearing races may be equipped with indexing relieving toolblocks. At the end of the cut, these automatically rotate the boring bar about 90° to insure the toolbit clearing the work as it is withdrawn from the piece. The bar then indexes back to the cutting position for the next cycle.

One machine also can be equipped with an air-operated, two-station indexing boring bar that permits roughing and finishing the bore in one continuous cycle. After the roughing pass, the bar indexes to bring the finishing tool into position and the finish cut is taken as the carriage feeds out of the bore. The same sequence can be followed in turning the OD of the work in the next setup. This method is intended for high-production of bearing races.

Production planning

Although automatic lathes are ideally suited to long-run work, it is possible to apply them profitably to short-run jobs. This is true to some extent because improved adjustment and change-over features of modern equipment have reduced the time required for setup. However, the application of automatic lathes to shortrun work can be exploited to the fullest only with good production planning, in which similar jobs follow one another as much as possible, and production-planning men are fully acquainted with the possibilities and limitations of the particular machines to be used. For example, during one production period, requirements may call for a number of gear blanks of different diameter but of the same width. If these can be run consecutively, straddle-facing tools need not be changed from one job to the next, thus saving change-over time.

Other practices that cut setup time include: master samples so

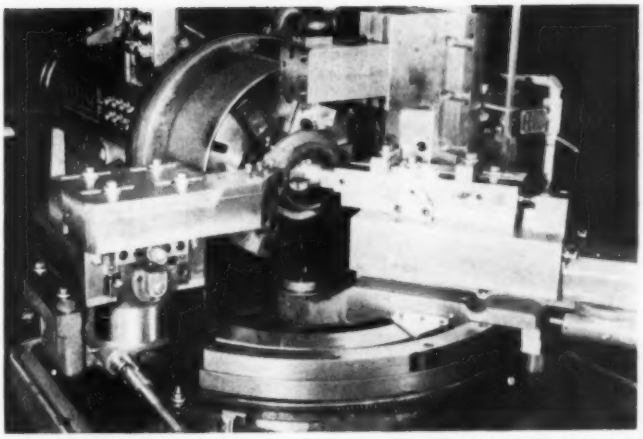
tools can be set up around the part in approximately correct position, thus requiring only minor adjustment to obtain the drawing dimensions; special toolblocks with tools pre-set from master gages are held ready for setup when the job runs. This latter method, of course, increases the shop investment in tools and adds to the problem of storage. However, practices such as those outlined have been applied successfully, in some cases making possible the application of automatic lathes to jobs ordered in lots as low as 20, 30, or 40 pieces, as well as to lots of 200 and 300 on the shorter-cycle jobs. The decision rests on whether the saving in cycle time is sufficient to offset the setup costs of the job.

Special setups

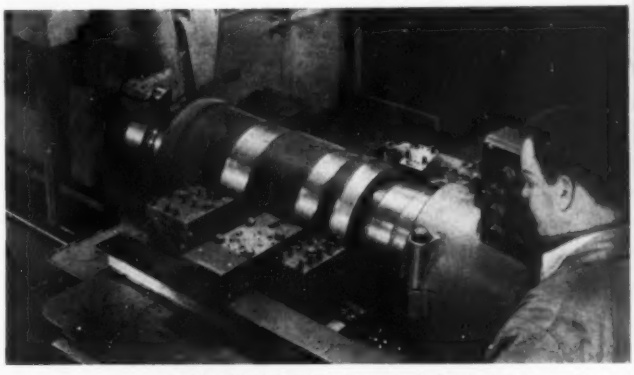
For certain high-production jobs, it may be worthwhile to develop special tooling or even a limited-purpose setup. In some cases, the objective is to reduce still further the small amount of manual labor required to operate an automatic lathe that has been set up in the customary way. Heavy work, for example, can be handled with mechanical devices built onto an otherwise standard machine. In one setup, a hydraulically operated loader reduces the time for chucking a heavy part to 0.20 min.

In other cases, it is possible to equip a basically standard machine to do a job that is beyond its range with standard tools and attachments. An interesting job recently disclosed involves superfinishing in the same setup as turning, boring and facing operations. Two heads at rear positions come in to finish surfaces machined by tools at the front position.

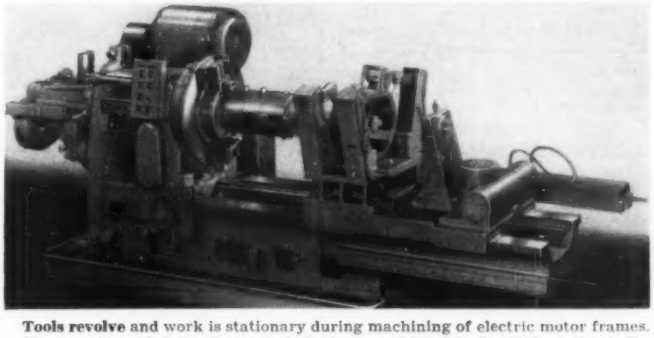
Normally, the tooling for special jobs is developed by the manufacturers in cooperation with the user of the equipment. Some of the many setups that have been worked out to meet the requirements of a particular job are shown in these pages. Actually, the possibilities are practically unlimited, as the basic versatility of the equipment offers the tool designer wide latitude in the planning of unusual as well as conventional setups.



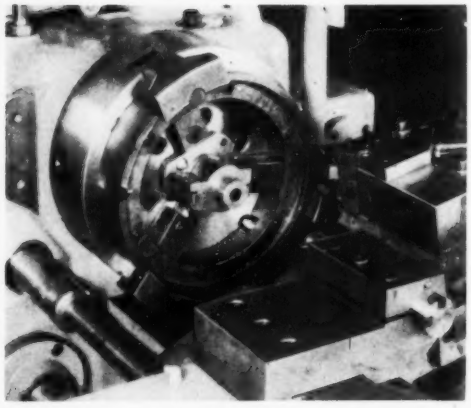
Spherical-boring setup handles wide range of sizes on high-production basis. Three preset toolbits in ball-head generate radii as slide pivots from rear to front. Straight and taper boring also can be done, as well as turning on the front slide, and facing, chamfering and cutoff on the overhead slide

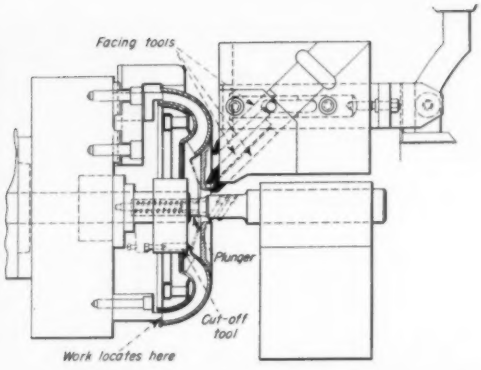


Machined in lots of 20 pieces, cylinder liners are rough- and finish-turned in two operations on automatic lathe with savings of 66 hr over previous method of machining. Part is 32 in. long and 16¼ in. in diameter. Machine has 75-hp motor



Tools revolve and work is stationary during machining of electric motor frames. Single tool rough bores frame as it feeds toward headstock. At face of spindle, cam action moves two tools outward to face end of frame. At same time, necking tools cut snap-ring grooves. When these tools withdraw, work feeds back and is finish bored on the way



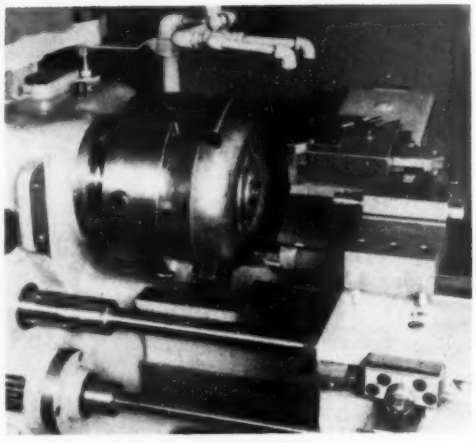


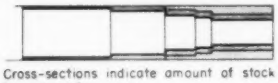
Cutoff tool in spindle permits removal of ring of waste metal from torque-converter coupling without second operation. Tool, which does not revolve, is mounted on bar that runs through spindle and is fed by cam driven by regular feed cycle of machine. Plunger with mushroom head catches ring as it is cut off

ACKNOWLEDGMENT

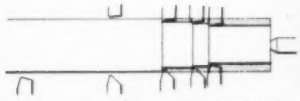
We gratefully acknowledge the cooperation of the following companies in the preparation of this report:

Gisholt Machine Co.
Jones & Lamson Machine Co.
The R. K. LeBlond Machine Tool Co.
Lipe-Rollway Corporation
The Lodge & Shipley Co.
The Monarch Machine Tool Co.
The Morey Machinery Co., Inc.
The National Acme Co.
Pratt & Whitney Div., Niles-Bement-Pond
Reed-Prentice Corporation
Seneca Falls Machine Co.
Snyder Tool & Engineering Co.
Sundstrand Machine Tool Co.

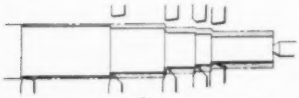




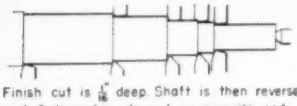
Cross-sections indicate amount of stock to be removed



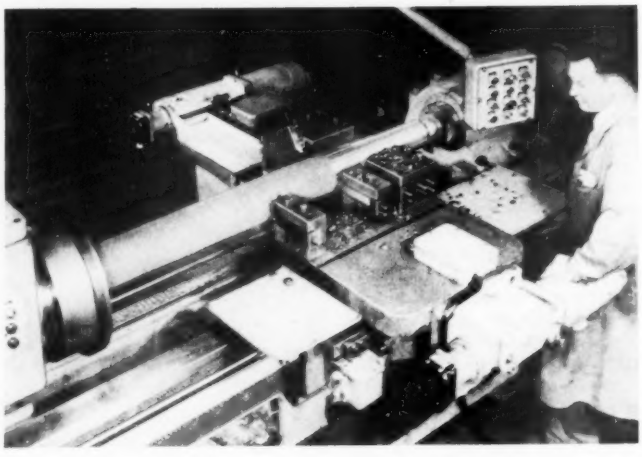
Roughing cut is $\frac{3}{8}$" deep, speed is 300 sfpm and feed rate is .027" per revolution



Semi-finish cut is $\frac{1}{16}$" deep and utilizes front slide only.



Finish cut is $\frac{1}{16}$" deep. Shaft is then reversed and 4 diameters turned on opposite end



Automatic tool-setting cycle permits rough, semi-finish, and finish cuts to be taken consecutively in one automatic machine cycle. Tools automatically are positioned for three different depths of cut through special feature added to otherwise standard machine. 75-hp lathe removes 85 lb of metal in 9 minutes

ROUND TABLE

Bargain Shopper

"You're kickin' around awful bright and early, m'boy," cracked Ed as Al sauntered into the two-by-four office at 8:02 a. m.

"Yeah," replied Al, slumping into a beat-up chair and thrusting his feet onto the desk top. "I was just wondering if you knew that the tool-maker you hired away from Universal yesterday hadn't quit before he was sure of the job here."

"No, I didn't, Al. I figured that he'd already quit, or been fired. I know one thing, though—he's a good man."

"Well, maybe; but I hate to see any of that labor-stealin' get started again. It was pretty bad during the war, and it looks like it might get bad again."

"Now wait a minute, pal. In the first place, I wasn't stealing labor. I didn't know he was just shopping around for a higher-paying job when he came in; and in the second place, it wouldn't matter if I had. I can name five or six men over at Universal who left here under about the same circumstances."

"Maybe so, Ed, but I hate to see the old throat-cutting game get started again. It doesn't do our reputation around the town any good, and it doesn't do our own personnel any good, either. They're liable to lose what loyalty they have if we get fancy with labor."

"Who's gettin' fancy? Look, all I did was hire a man who was out of a job—at least I thought he was out of a job. If it looks fancy, it's his fault and not my responsibility."

"You're whitewashing yourself, Ed."

"No I'm not, Al, I'm right! Besides, what do you expect me to do about it—assuming that you're right, which you're not? You want me to fire him and send him back to Universal?"

"Well, I suppose that's not practical; but you might tell them at Universal what the facts are—just so they don't get down on us."

"Heck, no, Al. We've got to turn out our work, and business is business."

"Yeah, but sometimes business doesn't smell too healthy—especially the business of cutting in on someone else's employees."

IS THIS LABOR-STEALING? *If so, can you do anything about stopping it before it starts, or is competition for labor in busy times just a hopeless problem? Your ideas and opinions will help others.*

SILVER BRAZING EASES

Combine silver alloy with a well-shaped rib at the proper temperature, keep it clean, add more parts and some silver alloy rings, induce heat — and the product is self-finishing. Production capacity is improved; pleasing appearance is a natural result

Experience with silver brazing alloys during World War II was a factor in aiming toward the goal of high post-war production at High Standard. Post-war developments will lend themselves just as readily to the new demands which industry now faces for defense.

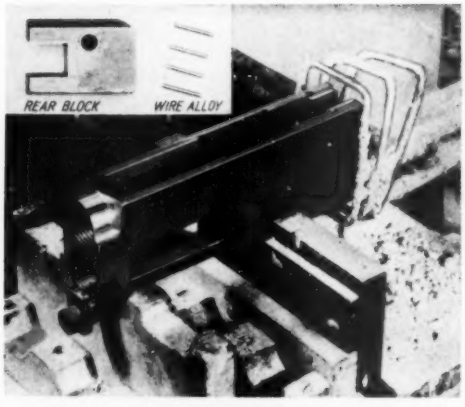
In addition to its own "Hi-Standard" line of .22-cal sporting pistols and deep-hole barrel drills, this company also produces "Higgins" rifles and shotguns for Sears, Roebuck and Company. For this discussion, one of the latter, the J. C. Higgins Model 20 Deluxe, 12-gauge pump-action shotgun, is an outstanding example of silver-alloy brazing value for production. This model has five sub-assemblies comprising six silver-alloy-brazed joints.

An alloy of Ag-Cu-Cd-Zn with a flow point of 1145° is used for all of these joints. Some assemblies, by their nature, require shim stock, while others are joined by using rings or straight pieces of small diameter wire. The importance of the six fundamental steps can never be minimized. These are: 1, good fit and proper clearance; 2, clean metal; 3, proper fluxing; 4, assembly and supporting; 5, heating and flowing alloy; and 6, final cleaning. By adherence to these, consistent production of high-standard, low-cost brazed joints is assured (*AM*—Sept. 18, '50, p 100).

Good fit and proper clearance are accomplished by accurate machining. Many years of accuracy in gunsmithing have provided the know-how for this phase of brazing. Normal tolerances are closer than the acceptable joint clearances of 0.0015 to 0.005 in. for silver brazing.

Using alkali solution wash tanks, surfaces are prepared for the operations that follow. All joints and adjacent areas are fluxed with Handy Flux to promote the flow of brazing alloy and to minimize the cleaning of surface oxides (adjacent to the joint) after brazing. All of the parts, with the possible exception of the compensator barrel assembly, are self-jigging for assembly. From this phase forward, each sub-assembly represents an individual operation.

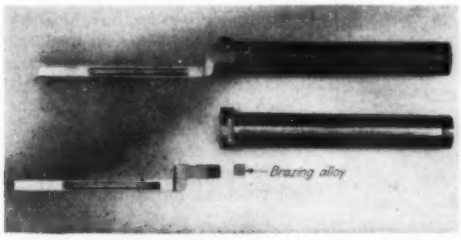
Production tested against other joining mediums, the Ag-Cu-Cd-Zn alloy proved its worth in time and output. Six sound, high-strength joints are made in approximately 3½ min with less than 1 oz of silver-brazing alloy per gun.



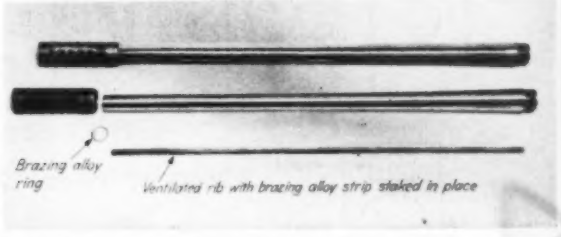
Induction and furnace brazing are utilized to complete this shotgun barrel, four operations with the former and one with the latter. Receiver and rear-block assembly is composed of two steel blocks joined with four pieces of brazing alloy (insert) 0.070 in. in dia by ⅝ in. long. Alloy is placed on top of joint two pieces to a side, and joint area is placed in induction field. As a result of its fluidity at temperature, this is sufficient alloy to flow down and through entire joint area. Operation is complete in 28 sec, during which operator places a plug in forward part of previously brazed piece to prevent loss of gap tolerance during cooling. Barrel assemblies are loaded, six to a jig, then brazed in controlled-atmosphere furnace at temperature held between 1400 and 1425 F and using Hy-ex gas atmosphere. Operation brazes six barrel assemblies each 15 min; fits very well with induction schedule

SHOTGUN WEDDING

BY KENNETH IRELAND, Chief Metallurgist
HIGH STANDARD MANUFACTURING CORP., HAMDEN, CONN.

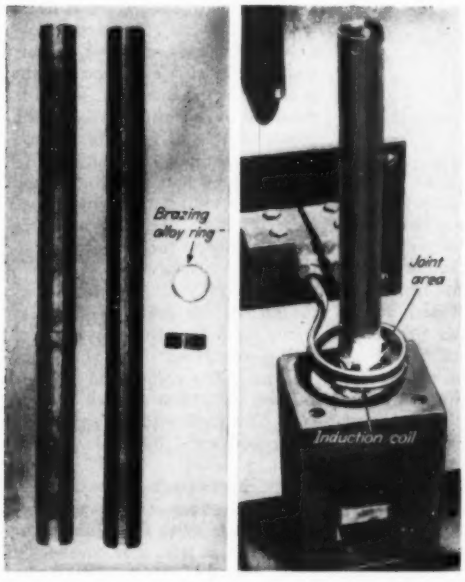


Action bar and forehand tube are joined by silver alloy ⅜ in. sq by 0.015 in. thick. Assembly is self-jigging and action bar is accurately located by clever joint design. Alloy is preplaced immediately after fluxing and prior to assembly as necessitated by joint design and a 5-sec operation cycle which does not permit time for any pre-brazing operations, normally possible with induction brazing

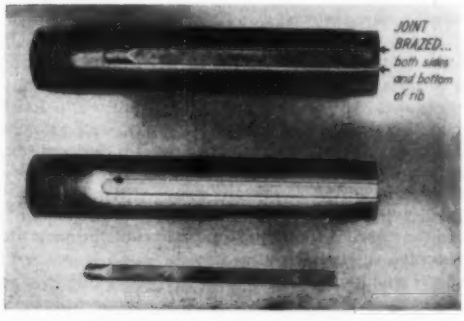


Complex jigging characterizes this assembly, the compensator barrel. First, a strip of silver alloy 20 in. long by 1/16 wide and 0.010 in. thick is assembled to underside of ventilated rib, after rib has been fluxed. It is staked in place at 11 points along rib to prevent movement. Compensator to barrel joint utilizes a 0.890-in.-OD silver-alloy ring of 0.031-in.-dia wire preplaced in an internal ring groove in compensator.

Jig is of stainless steel, hence replacement cost is high. Considerable attention is given to protection of jig as well as to joint. One paper ring is placed on threaded end of barrel prior to insertion into compensator. Paper prevents brazing of barrel to jig and aids in rib location (without it rib might project too far forward, thus prevent proper mating in final assembly). Paper is also used when barrel assembly is placed in jig; strips being placed at all points where jig touches assembly, to prevent flux accumulation on jig by introducing an unclean surface. Proper use of paper strips has turned on otherwise objectionable introduction of carbonaceous material to a definite advantage. Jig containing six assemblies is placed in furnace

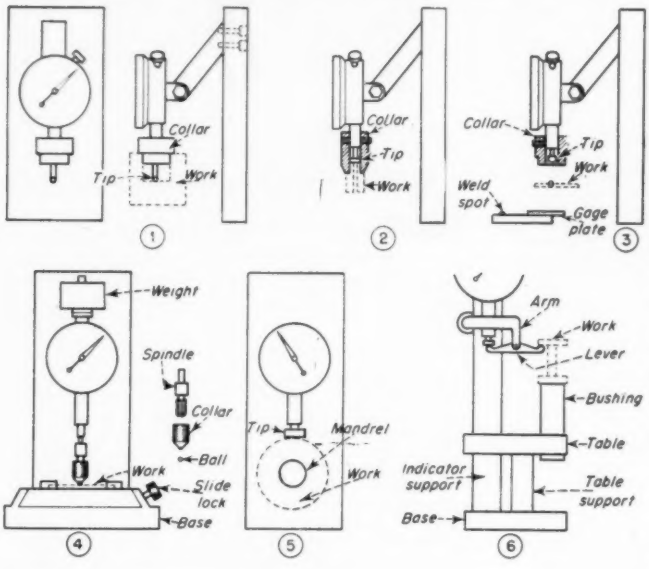


Silver-alloy ring, preformed of 0.025-in.-dia wire, joins magazine tube and ring. Joint area is fluxed, tube ring assembled, and alloy ring applied. ID of alloy ring is controlled to provide proper fit. Jig design (insert) is such that the part is separated from the joint area, thus permits full input of heat to the joint; prevents heat loss into jig by absorption. Heating time for this assembly is 5 sec, which coincides with other brazing steps



Receiver rib assembly is second brazing operation on receiver rear block. A portion of sighting rib is brazed to receiver, which has had a slot milled and has been contoured to blend into gunstock since first brazing, by induction heating in 25 sec. After fluxing, a strip of silver alloy 6 in. long by 0.003 in. thick is placed in slot and receiver rib positioned. Placement is critical as rib must meet barrel rib assembled later

Practical Ideas



Dial-Indicator Setups Simplify Inspection Jobs

ELIMINATING HUMAN ERRORS in inspection departments is an important point in planning the methods by which each job is to be checked. These fixtures cover a fair range of inspection jobs, showing how accuracy can be held or improved by the use of indicators instead of instruments such as calipers, micrometers, and vernier gages, which depend partly upon the skill of the inspector.

(1) The first setup is for checking the depth of a hole. The turned collar is faced off accurately, provided with setscrews that clamp it to the stem of the indicator, and is located on the stem to provide a fixed shoulder against which the hole can be gaged. A special long contact point is made accurately, and is threaded into the spindle of the indicator. Work is brought up against the indicator spindle, set square against the heavy shoulder of the collar, and a reading is taken to check the part.

(2) The second setup is similar to the first, but this one is for checking the length of a shoulder on the end of a bored piece. Here, too, a collar provides a reference shoulder. The special contact point is a round disk that fits inside the bore of the collar, but does not fit inside the work, thus providing full contact all around the lip of the work. Readings on this setup, as well as the first, are compared to those obtained with pieces of known accuracy or to master parts.

(3) The third setup is for checking the amount of distance a small ball projects through a plate. The ball is pressed into a hole in the plate. This is also a vertical setup. To keep the setup simple by eliminating the need for a baseplate under the indicator spindle—as was done for the first two setups as well—a reference plate is made. A small spot of weld metal is deposited on a thin plate, and this is ground off to the same height above the plate as the ball should project. This can be checked with the dial indicator and a gage plate or shim. Then this reference plate is used to help set the indicator for the inspection job. A collar is mounted on the indicator's stem, and a contact tip is installed in the spindle. The bezel of the indicator is adjusted with the reference plate under the spindle, touching the collar, until the pointer registers zero. Then a test part is held against the collar with the ball touching the spindle to show a reading.

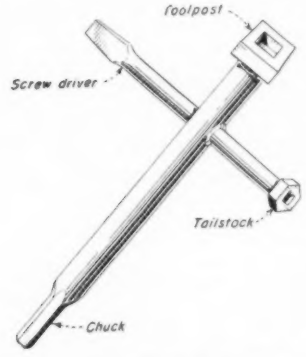
(4) The fourth setup is for checking the thickness of a plastic disk. For this sort of measurement, standard procedure is to weight the indicator spindle according to standards. Actually, only a comparison is necessary, so the weight can fall inside a range, preferably worked out by a society that deals with the material. Most compressible materials are gaged in this manner. In this case, the weight is added to the indicator, which is mounted over a sturdy table. The contact tip is made up of a short shaft, a threaded collar, and a chrome-alloy ball that is chucked inside the collar, but which projects slightly. The test indicates variations from the average thickness of the plastic parts.

(5) The fifth setup is to inspect the OD of the same plastic disk, which is mounted in a thin mandrel and is contacted by a wide-surface tip. The same kind of base as used for (5) is utilized.

(6) The sixth setup is for measuring odd axial dimensions on a small, collared shaft. The setup shown checks the distance between the lower edges of the two integral collars. With a table arrangement such as this, it is possible to press various bushings into holes in the table so a number of surfaces can be contacted by the lever, which will transmit motion to the tip of the dial indicator. Direct measurement of the shaft, using its top or bottom end on contact with the tip, can be set up, too, if

the lever is flipped out of the way to clear the tip. The lever is normally supported by an arm clamped to the stem.

Similar setups can be made for many inspection operations. In some cases, gage blocks can be used to set the indicators for zero, while in others the indicator can be set after a sample batch is run through to give an average reading (as in the case of the plastic part) so those parts too thick or thin can be separated. *Marc Bell, New York, N. Y.*



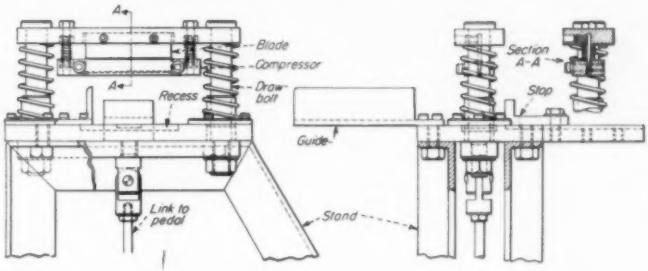
Combination Tool Handles All Lathe Adjustments

MOST LATHE HANDS won't admit it, but a lot of time is lost in searching for the tools that operate machines. These include the toolpost wrench, chuck key, tailstock-adjustment key, and perhaps a screwdriver. These include the toolpost wrench, a simple cross-shaped device as illustrated. *George F. Burnley, Oakland Calif.*

Split-Pipe Chuck Grips Rods for Facing

A RECENT JOB called for smooth-facing several thousand 7/16-in. brass rods, the ends of which were ragged and uneven after being sawed. We solved the problem quickly and inexpensively by gripping the rods, a bunch at a time, inside a steel pipe.

A piece of 1½-in. steel tubing was slotted lengthwise and placed in a three-jaw chuck; seven rods were placed inside the tubing. As



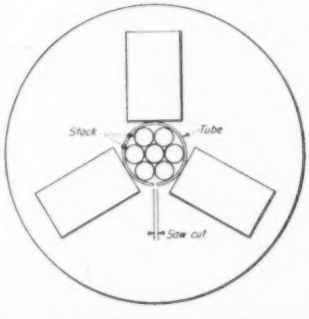
Coolant-Hose Cutter Has Stripper-Compressor

A FOOT-OPERATED guillotine was designed and built in our shop to replace a bandsaw in cutting lengths of rubber hose that connected up the cooling systems of internal-combustion engines. It cuts clean and square ends.

An interesting feature of the device is the compressor, which flattens the tube before the blade cuts it. This compressor was made in two sections, then bolted together to surround the blade and to compress the hose all around the blade. A piece of hardwood was inserted in a recess in the table to protect the blade.

As the pedal is depressed, the blade and compressor come down. As the hose is compressed by the compressor and the coiled springs that back it up, the blade continues down to slice the hose. Springs around the main posts return the blade when the pedal is released.

Adjustable stops are provided to locate the hose under the blade. An angle-iron stand on which the cutter is mounted makes it an operating unit by itself, and it can be located anywhere in the shop, right on the floor. *R. B. Wolverhampton, Staffordshire, England.*



the chuck jaws were clamped down, the tubing was compressed enough to hold the rods securely. A standard 1½-in. end mill was placed in the lathe tailstock and run up against the rods, producing a smooth finish and cutting all the rods to the same length. *Irving Mansfield, New York, N. Y.*

Bronze Counterweights Replace Steel in B-47B

ELEVATOR AND RUDDER counterweights are now made of bronze instead of steel as a result of research by a brass company. The material is non-magnetic, which allows a compass to be placed close to the components. As a measure of economy, bronze is more satisfactory because extruded shapes can be utilized instead of machined steel weights. This saving has promoted further use of bronze, even where magnetism is not a factor, in other parts of the plane. The extrusions are standard architectural shapes, produced in large quantities for the building trades, which makes them more economical than steel counterweights that are specially machined. *Revere Copper and Brass, Inc.*

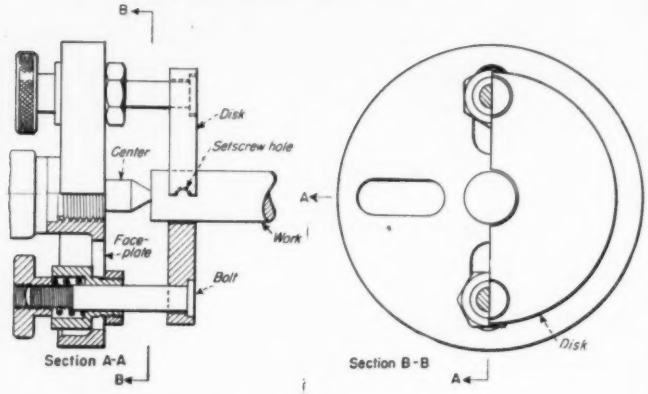


Plate Dog for Lathe Prevents Axial Shift of Work

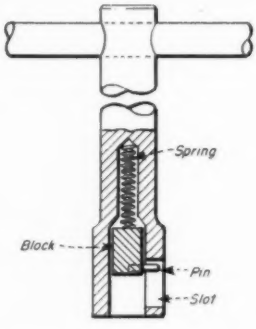
SOME SMALL BATCHES of flanged parts that had to be precision-turned caused us trouble recently because we had no accurate chuck for the bench lathe we were using for the job. We couldn't center the work because of the flange, which would be outboard, and we couldn't chuck it because of precision requirements. This slightly unusual driving dog was the result.

A regular lathe faceplate was mounted, as was a headstock center. To hold the outboard end of the work, we rigged the lathe steadyrest so it would just clear the flange.

The usual lathe dog would not work at the headstock because nothing would prevent it and the work from riding away from the faceplate as the spindle revolved.

Two assemblies made up of headed bolt, knurled nut, recessed collar, spring, and locknut were inserted in the regular slots of the faceplate. The headed bolts nested in recessed holes through a round disk through the edge of which three holes were drilled and tapped for setscrews that gripped the small diameter of the work.

With the center in place, a workpiece was entered through the steadyrest and pushed up to the center, which kept it in line. After initial adjustment, only one of the three setscrews had to be loosened to allow removing a finished part. *Tom Brown, Middlesex, England.*



Machine Wrench, Like Kleenex, Pops Up

WE HAVE HAD to make a new square-end wrench for one of our machines at least four times in the past three years, usually because someone walked off and left the wrench attached to the bolt and started machine operations. Here is a simple design for such a wrench that is easy to make and will save costly repairs because it automatically ejects itself.

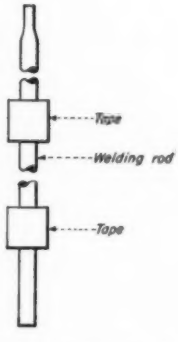
The wrench itself is quite conventional, but a blind hole is drilled down the center to take a spring that backs up a short block. One side of the wrench is slotted out to take a small pin that fits into this block, thus preventing the block from coming all the way out of the wrench. After the wrench has been applied to the bolt to tighten it, and is released, it pops up because of spring pressure. *Charles A. Newkirk, Jersey City, N. J.*

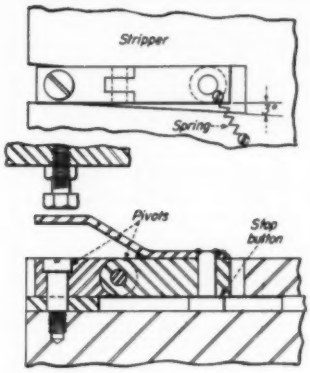
Welding Rod Pulls Junk Out of Holes

HERE IS an idea for removing foreign objects that are dropped or lodged in a blind hole in a workpiece, providing the objects are not too tightly jammed.

Take a small-diameter length of welding rod to match the material in the hole, wrap a couple of lengths of electrical insulating tape around it in two places to act as a set of spacers, and insert the rod in the hole. After the rod is centered in the hole, but has not yet been pushed down to touch the foreign object, turn on welding current. As the rod is lowered, the current will arc between the rod and the object, but the arc will be killed when the rod touches the object. As soon as this happens, turn off the current.

Now the rod should be welded tightly to the object, allowing both to be pulled, wiggled, or twisted out of the hole. The only real limitations on this idea are very small holes and objects that are really jammed in the hole—like a tap. Even a tap can sometimes be pulled out. *Ray Karl, De Ruyter, N. Y.*





Die Stop Swings To Relocate on Stock

BLANKING, PROGRESSIVE, OR COMPOUND DIES can be fitted with a simple and easily made gage or stock stop that will last a long time. The one we first made has operated on a die that ran over 200,000 pieces.

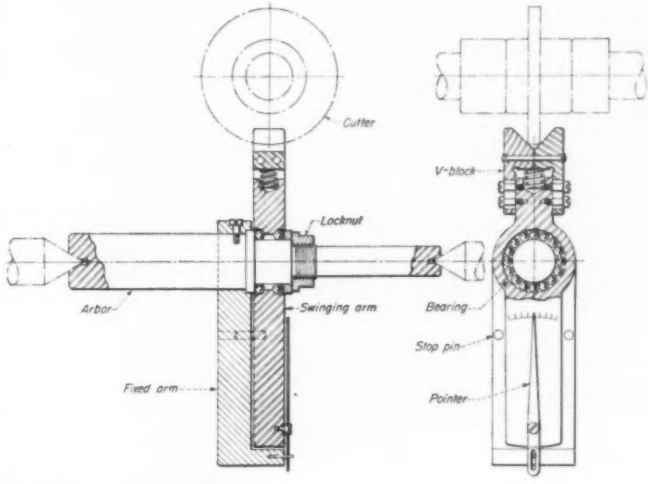
The stop fits into a notched-out section of the stripper plate, and is pivoted at two points. As the punch holder descends to stamp or cut stock already in place, a bolt head contacts a lever that is welded to the top of the stop member. This lifts the working end of the gage member as it swings on one pivot. As the tip of the gage clears the edge of the stock in the press, a small spring pulls it forward as the whole gage swings on the other pivot. Movement is opposite to the normal direction of stock feed.

To allow this swing, the slot in the stripper plate is cut so its front edge was angled off at about 3°. As the punch holder raises, the gage drops down slightly forward of its normal position, striking stock that has not been punched. Stock is then fed into the die with the gage riding on it. Finally, the gage drops into a previously punched hole or the edge of a new piece of stock—whichever kind of edge is to be stopped—and stops the material in position. The stock forces the gage back into normal position against spring pressure. *A. J. Sheehan, Louisville, Ky.*

Handlebar Grip Kills Tool Vibration

TOOL VIBRATION troubled us recently when we started a forming operation on a large number of steel parts in a small lathe. All lathe parts were in good adjustment and the tool and holder were well tightened.

To reduce continued vibration, we borrowed a chunky rubber hand grip from a vacuum cleaner, forced it over the rear end of the tool shank, and inserted a wood packing piece between the rubber grip and toolholder. This grip was easily removable when regrinding the tool was necessary. The cure for chatter was effective for a run of over 10,000 parts. *Ian J. Peacock, Carlisle, England.*

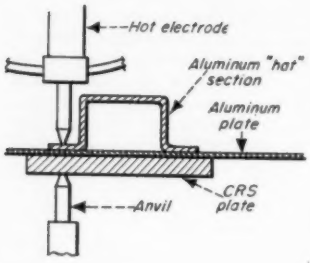


V-Block Indicator Centers Work Under Cutter

TO LOCATE a shaft accurately under a milling-machine cutter so a keyway slot can be machined, we utilize a simple-to-operate alignment gage that is swung temporarily between centers in place of the regular work arbor.

The device is built up on an arbor centered at both ends which carries a fixed arm and a swinging arm. The swinging arm rides on a bearing made up from loose bearing balls made permanent on the arbor by means of washers and a locknut. A sliding V-block is located at top of the swinging arm to nest the cutter. This block is equipped with a spring that loads it vertically and with setscrews that confine its motion so it cannot fall off the arm.

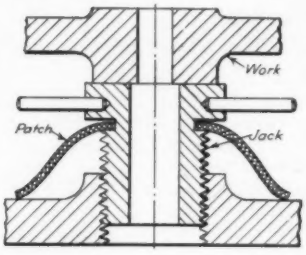
Two stop pins through the fixed arm limit motion of the swinging arm; these are located on the lower part of the arm. A pointer is pivoted on the lower end of the swinging arm and is controlled by a pin in the fixed arm that goes through a slot in the pointer's lower end. This pointer indicates relative side motion or side misalignment of the cutter in relation to the centerline of the arbor. By adjusting the cutter on the milling-machine spindle until this pointer indicates exactly center, alignment of the cutter for the slotting operation will be made perfect. It is important that both edges of the cutter contact the faces of the sliding V-block. Within narrow limits, this is accomplished by the spring underneath the block. *Nobuo Arakawa, Tokyo, Japan.*



Backup Plates Spread Welding Heat

A DETROIT MANUFACTURER of aluminum garage doors uses "Hat Section" transverse ribs to stiffen the doors. For a long time he had difficulty in getting good spotwelds on this light sheet metal.

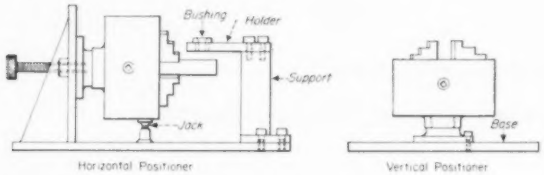
By using a strip of cold-rolled steel between the anvil and thin sheet, he reduced concentration of heat at one spot. Now he is not burning through and he is getting secure welds. In addition, proper timing reduces the tendency to weld the aluminum to the steel backup plate. *Chester S. Ricker, Detroit, Mich.*



Flexible Patch Protects Screw Jack

DESIGNERS often specify screw jacks to support the work beneath pressure areas in drill jigs and milling fixtures. After some use, however, chips lodge in the threads and jam the jack.

A simple remedy is as follows: cut a recess above the threads but below the head of the screw jack and force a circular patch of inner tube over the threads until it nests in this recess. Such flexible portection will keep chips out, but will not interfere with the operation of the jack itself. *H. G. Frommer, Milwaukee, Wis.*



Two Chuck Positioners Locate Work Accurately

CYLINDRICAL PIECES can be accurately and securely clamped for light operations by utilizing a regular three-jaw universal lathe chuck in a suitable bench adapter. The advantage of this system is that the adapter is cheaper and quicker to build than a fixture and the chuck is a dependable device with known accuracy.

Two adapters are illustrated: one for positioning work horizontally, and one for positioning work vertically. The horizontal setup includes a long baseplate and angle plate suited to hold the chuck, but to allow for adjustments. The tailstock-end of the plate is fitted with a heavy post and bar that will retain a drill bushing over the stock that is being clamped. Just for extra sturdiness, the chuck can be jacked up.

The vertical positioner is a simple setup with a flat plate underneath the chuck. Both setups are suitable for short-run drilling, milling, and assembly operations, as well as for inspection. *Arthur R. Christensen, Lockport, N.Y.*

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for the best PRACTICAL IDEA

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REQUIREMENTS —Only items in the Practical Ideas pages are eligible, and they must be submitted directly by the originator. Do not worry about your shortcomings as a draftsman, photographer or author —every item will be edited in accordance with *American Machinist* standards and suitable illustrative or explanatory material added where needed. Readers will judge only the finished product—in terms of its usefulness to them.

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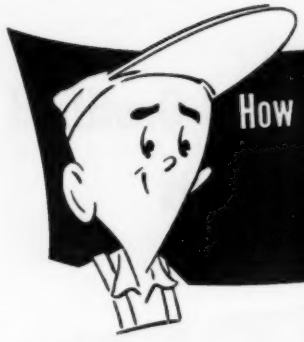
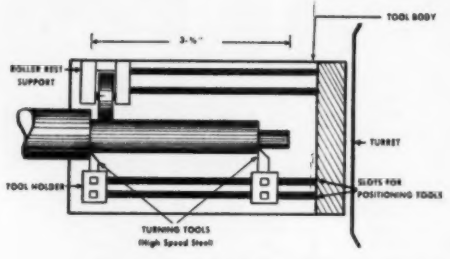
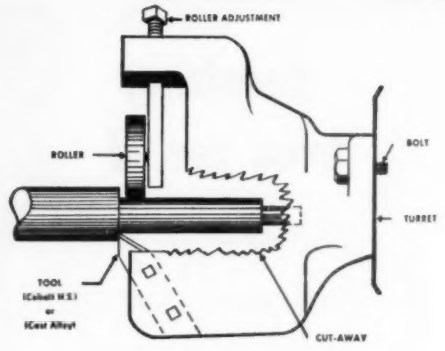


How 2 single-cutter box tools solved a problem ...by Stainless Sam



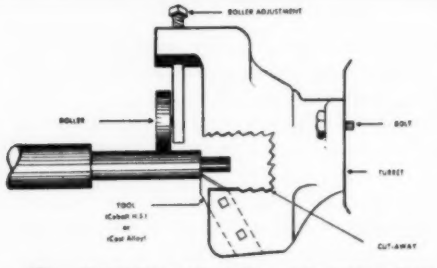
1 When Stainless Sam called on this machine shop, the operators were having a tough time with this job. They were running a ⅝"-diameter free-machining stainless steel bar on a turret lathe, using a two-cutter box type turning tool. Tool life was poor, and because of excessive overhang, surface finish was unsatisfactory.

Stainless Sam knew that by changing to two single-cutter box tools results could be improved, and machining time could be cut too.



2 He set up the first cut as shown in this sketch. The larger bit made it possible to use a 10% cobalt high speed or cast alloy tool, permitting an increase in feeds and speeds.

Since the job requires turning to only two shoulders, and one of the turned-down diameters is very short, the increase in feeds and speeds more than compensates for the time required to make the second cut.



3 Making the second cut this way decreases overhang and improves surface finish. Note that the roller-rest bears against the diameter turned in the first cut. This provides much greater assurance of accurate centering.

THIS WAS THE SCORE:

4

OLD METHOD—
Speed: 70 SFM; Feed: .0075" per rev.
Total machine time.....68 seconds

NEW METHOD—
Speed: 140 SFM; Feed: .010" per rev.
First Cut.....25 seconds
Indexing of Turret.....5 seconds
Second Cut.....7 seconds
Total machine time.....37 seconds
MACHINE TIME SAVED.....31 seconds

Oh yes, the problem of tool life and surface finish was solved too.

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REFERENCE BOOK SHEET

Should Die Thickness Be Calculated?

BY FEDERICO STRASSER

SELECTION of thickness of cutting-die members is universally based upon "practical experience." Not satisfied with this approach, I made a series of tests, whereby die plates were made thinner and thinner until breakage became excessive. From these data I find it possible to divide the calculation of die-member thickness into four steps:

1. Die-plate thickness is provisionally selected from Table I. This table takes into account the thickness of the stock and its ultimate shear strength. Table II provides shear strengths for most common materials.

2. Corrections:

(*a*) In no circumstance is a die plate made thinner than 0.3 to 0.4 in.

(*b*) The data in Table I apply to small dies; that is, those with a cutting perimeter of 2 in. or less. If the perimeter is greater than 2 in., the appropriate thickness from Table I is multiplied by an expansion factor selected from Table III.

(*c*) It is understood that these data apply to a die member made of tool steel, properly machined and heat treated. If a special alloy steel is selected, die thickness can be decreased.

(*d*) Die plates must be adequately supported on a flat die holder. The data do not apply if the die plate is placed over a large bolster-plate opening and support is not die members is universally based adequate. But if the dies are press fitted into a shoe, the thickness of the member can be decreased up to 50%.

(*e*) Grinding allowance of 0.1 to 0.2 in. must be added to the calculated die thickness in order to accommodate a number of grinds (say 25 to 30 as a maximum), each of which will remove 0.05 to 0.075 in.

3. Determine the critical distance; that is, dimension *A* between the cutting edge and the die-plate border, Fig. 1. In small dies, the critical distance is 1.5 to 2 times the die thickness; in larger dies it is 2 to 3 times.

4. Finally check the die thickness with this empirical rule: The cross-sectional area $A \times T$, Fig. 2, must bear a certain minimum relationship to the impact pressure for a die put on a flat base. See Table IV. Here, impact pressure equals stock thickness times perimeter cut times ultimate shearing strength. If the die height calculated by steps 1 and 2 does not give sufficient "area" for the critical distance *A*, die thickness must be increased accordingly.

Data for correction of die-thickness calculations, as per point 4, are the result of information from E. G. Marshall, author of "Die Design and Die Making."

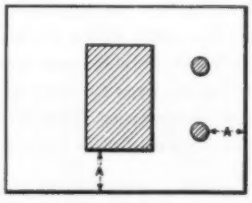


Fig. 1 .. Critical distance *A* must not be less than 1.5 to 2 times die thickness in the case of small dies

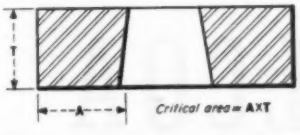


Fig. 2 .. Check the "critical area" between the die hole and border against minimum values in Table IV, and correct die thickness if necessary

Table I . . . ***Die Thickness Per Ton Pressure***

Stock Thickness, In.	Die Thickness, In.*
0.1	0.03
0.2	0.06
0.3	0.085
0.4	0.11
0.5	0.13
0.6	0.15
0.7	0.165
0.8	0.18
0.9	0.19
1.0	0.20

* For each ton per sq in. of shear strength

Table II . . . ***Shear Strengths of Metals***

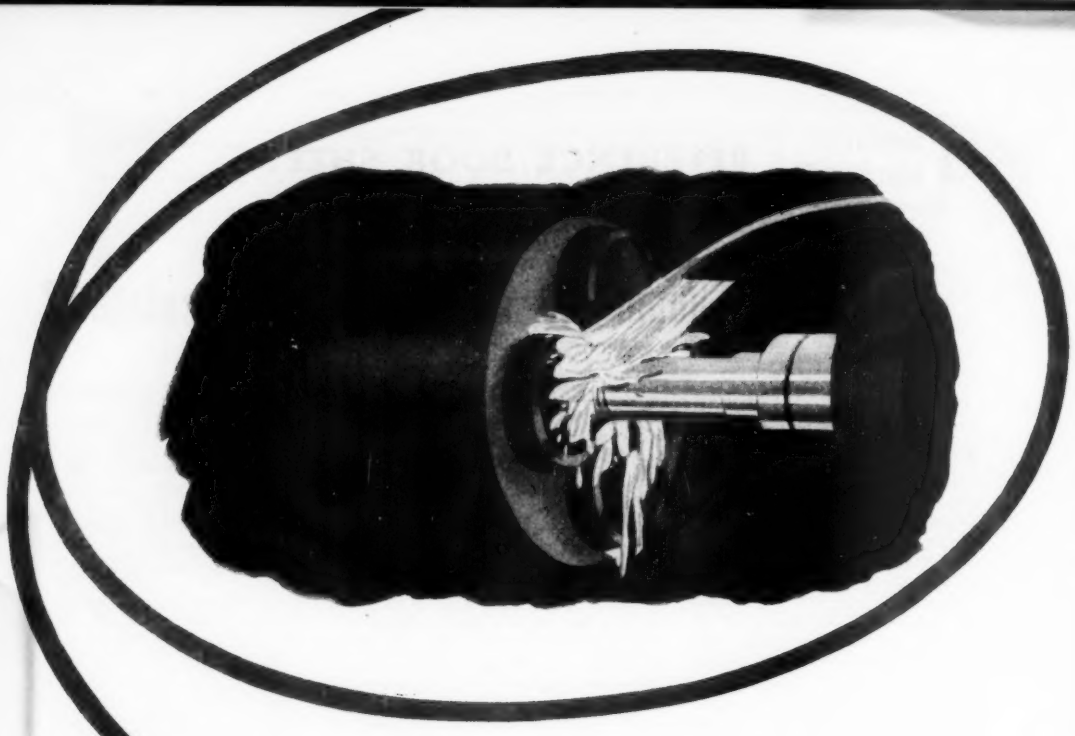
Metal	Ultimate Shear Strength, Tons Sq In.
Nickel	30 - 37.5
Hard steel	22.5 - 30
Mild steel	20 - 25
Brass	17.5 - 20
Copper	14 - 15
Zinc	9 - 10
Aluminum	7.5 - 9.5
Tin	2.5
Lead	2

Table III . . . ***Factors for Cutting Edges Exceeding 2 In.***

Cutting Perimeter, In.	Expansion Factor
2 - 3	1.25
3 - 6	1.5
6 - 12	1.75
12 - 20	2.0

Table IV . . . ***Minimum Critical Area vs Impact Pressure***

Impact Pressure, Tons	Area Between Hole and Border, Sq In.
20	0.5
50	1.0
75	1.5
100	2.0



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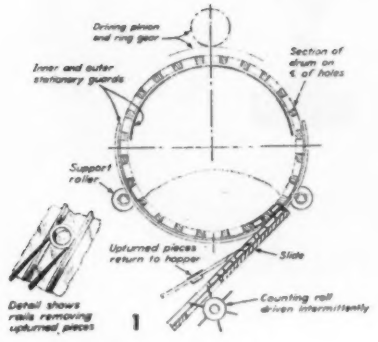
ALUMINUM SCREW MACHINE STOCK

American Machinist

Sorters and Feeders... I

BY WILLIAM SCHWARTZ, Consulting Engineer


Driving pinion and ring gear
Section of drum on ¼ of holes
Inner and outer stationary guards
Support roller
Upturned pieces return to hopper
Slide
Detail shows rails removing upturned pieces
Counting roll driven intermittently

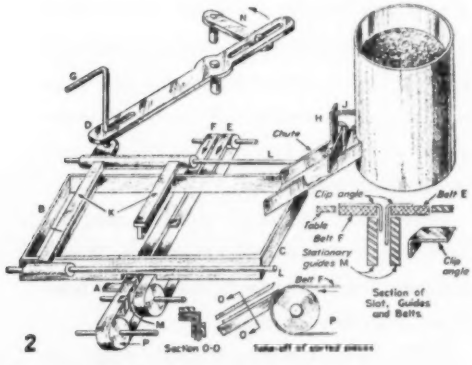
1

Drum Sorter for Flanged Work

A slowly revolving drum, driven by ring gear and supported on idlers, has stationary part-feed troughs at ends. One line of holes around the drum allows a stream of parts to drop onto a slide at exit point. An external guard keeps parts from falling through elsewhere, and an internal guard lining upper half keeps parts not discharged from falling back. Drum is slightly thicker than piece height.

A pair of slides projects into chute to pick up an upturned flange but clears those turned down, thus removing improperly oriented pieces. Rejected parts fall into tote box at slide end, or into hopper equipped with a return conveyor.

A counting roll holds parts on slide until needed. Slide will fill back to the drum. Parts carried to this point by drum will pass over last piece on slide and remain in holes until entry to slide is clear.



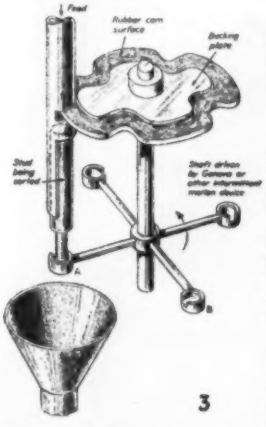
2

Wiper and Belt Sort Unequal-Leg Clips

A clip angle with unequal legs is sorted with the short leg up and delivered to a chute by the mechanism shown in Fig. 2. Parallel wiper bars *K-K* move between end rails *B* and *C*, positioned by the rods *L-L* and driven by the crank *N*. As the bars reach the right end of travel, projecting bar *G* strikes the pivoting gate *H*, which swings to pass a few parts down the chute from the hopper. Timing is such that they fall between *K-K*. The spring *J* keeps the gate closed unless struck, and feed can be regulated by lowering or raising *G*.

As the wiper bars move to the left, the mass of parts is piled against the right-hand one. This arm pushes them over the slot in the table between belts *E* and *F*. Some will drop one flange into the slot. These are carried outwards by the belts, and restrained from falling through by the guides *M-M*. Clearance between the bottom of the wiper blades and the table is such that the wipers pass over parts falling into the slot.

If only one line of clips is needed, belt *E* dumps its load into a tote box below the delivery end pulley. Belt *F* also carries parts, but half will have their long leg lying across its top surface. Block *A* is positioned just above belt *F* and projects inwards just far enough to be struck by the long leg of the clip but not by the short one. Thus, any clips which are improperly oriented are knocked off. Take-off from the belt to a chute is shown in section *O-O*, where a knifedge angle will pick clips off the belt.



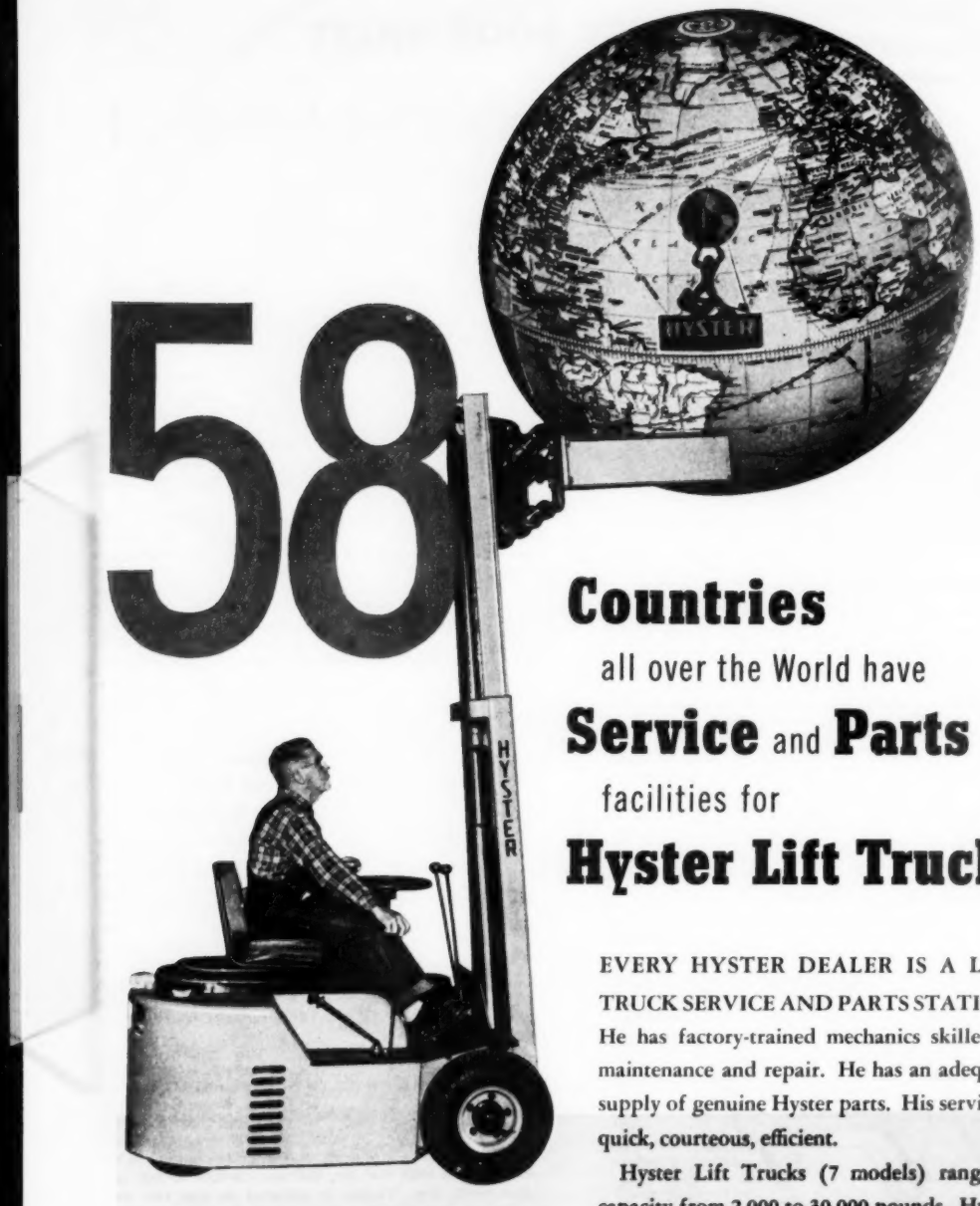
3

Cupped Arms Feed Parts Big End Down

Work like shoulder studs is oriented and fed big end down by the device sketched in Fig. 3. The parts drop continuously into the funnel; there are no rejects. By synchronization of the shaft drive with other equipment, the discharge is timed or counted.

The drive shaft mounts a spider and a rubber-edged, four-lobe cam. While a cam lobe projects into a slot cut into the feed tube, the workpiece above cannot drop. But when the cut-out in the cam coincides with the slot, the piece is free to fall onto a spider-arm cup. Timing is adjusted so that the piece hits the cup just after it is aligned with the tube centerline. Each spider-arm cup has an OD corresponding to the shoulder diameter on the piece. Cup ID is slightly smaller than the stud diameter. If the shoulder is down, it rests on top of the cup. After the dwell period, the cup is jerked out from under the piece, which falls big end down into the funnel.

If the stud end is down, the piece is engaged by the cup. Indexing tends to carry the stud end along with the spider, and the big end slides down the cut-away portion of the feed tube. When the big end clears the feed tube, it falls into the funnel.



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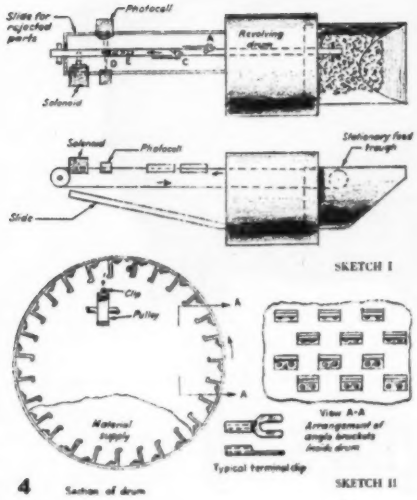
Sorters and Feeders... II



4

Drum-Belt Feeding, Sorting Hopper

Items that nest, tangle or have wires attached can be sorted to a specific end forward. In the case illustrated in Fig. 4, terminal clips are wanted in the orientation shown at *D*.

The drum is end-fed from a fixed trough, and is lined with staggered angle brackets having small lips. The brackets are just large enough to hold one piece, though in operation others will cling. As the terminal clips ride into the upper right quadrant of sketch II, most parts not securely resting on the brackets will fall.

The belt is so placed that parts tipping out of the brackets above will fall onto it; many will of course bounce off if the drop is too great or the belt is too resilient. The belt carries the clips past the fixed guide *A* and *C* which either line them up with the belt or push them off.

The photocell beam is interrupted by the high part of the clip, (the wire ferrule). By a suitable time-delay circuit corresponding to the time of belt travel from cell to solenoid, the solenoid is correctly energized. The solenoid plunger extends and retracts quickly; if the clip is turned like *D* on sketch I, the plunger hits nothing, but if it is turned opposite like *E*, the forked part of he clip is in the way and the solenoid plunger knocks the clip off the belt.

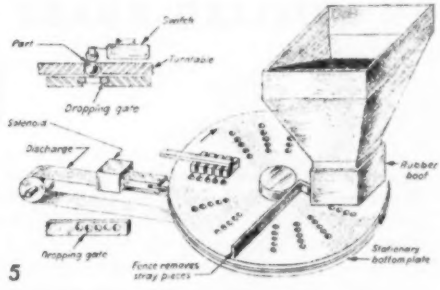
A trough below the belt carries rejected clips back to the drum. If this feature is unnecessary, the lips on the angle brackets inside the drum may be omitted, and the belt located just above the center and near the right side of the drum. In the case of the clips illustrated, the proportions and speed of the drum and belt may be adjusted so that only pieces falling to the belt with their flat sides down will remain on it.

Turntable Discharges Only a Complete Parts Group

A convenient means of selecting only complete groups of identical parts is provided by the turntable arrangement shown in Fig. 5.

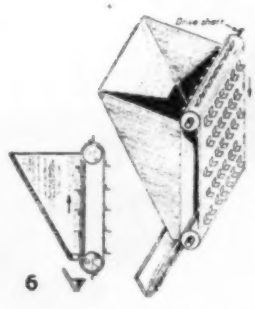
The part must not be too thin, and must easily enter a round hole. Delivery to the turntable is by a hopper with rubber outlet boot. Radial lines of holes in turntable pick up parts. Pieces that lock into the edge of a hole but do not fall into it are pushed into place by a fence or scraped off.

After passing the hopper, a line of holes moves to the discharge sector, where there is a dropping gate under the turntable. At this sector, there is a line of Microswiches, with rollers set to contact the parts. The switches are of the normally open circuit type and are wired in series. If the entire row of holes is filled with parts, the circuit is completed. Now, a solenoid is energized to pull out the dropping gate so that the complete group of parts can fall onto delivery belt or into a tube or chute.



5

Cleated Belt Prevents Clogging of Hopper



6

Objects having a major dimension more than twice the minor dimension will clog unless the discharge opening of a stationary hopper is made several times their length. One positive anti-clogging device is the belt illustrated. Cleats staggered in arrangement, are wide enough so that the entire length of the discharge opening is frequently cleared, but too small and narrow to support a piece lifted out of the top of the material heap. The hopper may drop parts to a belt below or be tilted so that the discharge opening is parallel to a sloping chute. When quarter full, this type of hopper increases its rate of discharge, otherwise the flow is relatively constant.

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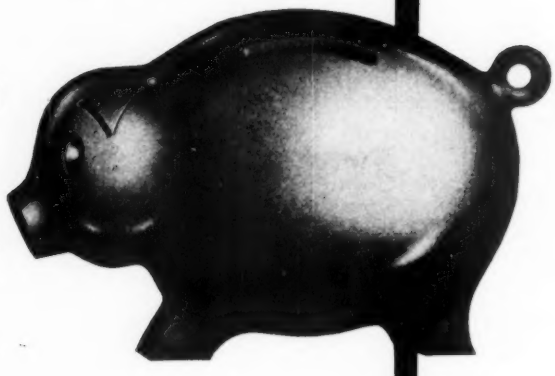

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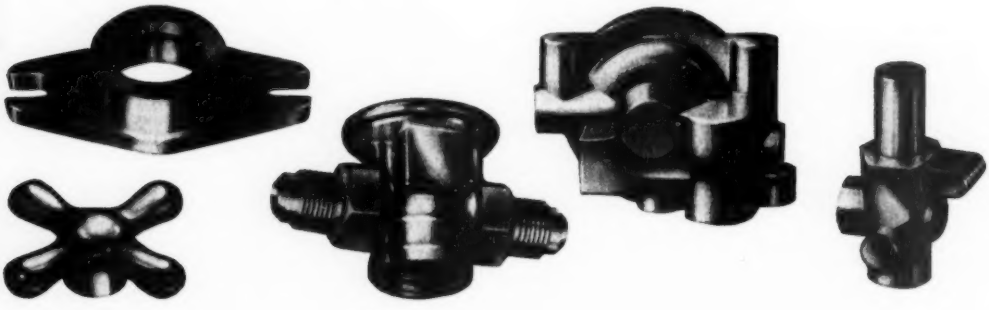

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TALKING SHOP

Sand Engineers

AMERICAN FOUNDRY & MACHINE CO., on the West Coast, makes castings for mine machinery, locomotive wheels, etc. No matter how carefully the metallurgists worked, 3 or 4% of the castings were faulty. Troubles were finally traced to the sand, so two metallurgists specially trained as "sand engineers" have been hired and set up in a special lab. The lab has the usual gyratory riddle, microscopes for analysis of sand structure, testing equipment for fineness, moisture, and compressibility. The engineers are teaching the foundrymen how to prepare mixes, and by so doing hope to whittle faulty castings down.

Scrap

A COUPLE of years ago, the management of one metalworking plant scrapped several hundred ancient units of equipment. They were lined up outside one building, waiting for the highest bidder—or the junkman—the day the board of directors was scheduled to meet. Too late the executives realized that every board member would pass the machines—and the fur would fly. But the first member to step out of the car that brought several was a manufacturer himself. He looked over the row, and said: "Scrapping that junk at last, eh? Should have been scrapped twenty years ago; our profits would be better now!"

Sit or Stand?

A COMPANY recently purchased several machine tools of a make not like those already installed—and found operators would not run them. The tool was just as accurate, investigation proved, and just as easy to handle—but the table was 3 in. higher. That forced operators to stand up, while the previous make allowed them to sit down. The company had to provide stools just 3 in. higher.

Planing Rescheduled

CEMENT-MILL LINER PLATES of steel at 260-270 Brinell, were formerly planed at 40 sfpm and 1/64-in. feed in a 50-year-old Niles planer. Planing six plates (offset 1⅛ x 9/16 x 32 in. in each) took 40 min. By shifting to clamped-on Kennametal grade K1 tools, the job was cut to 7 min. Feed was increased to 3/32 in. To substitute for non-existent tool lifters, 14-in. hinges were clamped on the tools to prevent dragging on the return.

Just to see what a modern machine tool would do, the job was put on a new Cincinnati Hypro. Feed and depth of cut were maintained, but speed increased to 120 sfpm, and job time dropped to 2.3 min, 1/16 the original time.

Ground Out

ONE DETROIT DIEMAKER had a big, solid progressive die that was to be scrapped because changes were made in the part. It was hardened steel, for strip stock. With a DoAll unit and the new strip-grinding blade (grinding stones attached to blade links), he cut out the die section which was wrong and made a new section to fit. The saving almost paid for the grinding machine.

Better Needle Slots

NEEDLE CARRIERS (SAE 4620) for knitting machines for ladies fine hose have 300 or more peripheral slots 0.125 deep by 0.0065 in. wide, yet are only about 4 in. in diameter. Slots must be accurately spaced, without burrs, and cuttting must be done so lands between slots are not crowded out of line during slitting. HSS saws caused distortion and left burrs. A shift to solid carbide saws permitted an increase in Brinell hardness of the piece from 330 to 360, and avoided the burrs and distortion, although cutting speed had to be reduced. Finish of the slot walls was also improved.

More Scrape

DIESEL LOCOMOTIVES have side panels made by sandwiching wood filler between two sheets of metal. To remove paint, a blowtorch was prohibited and sandblasting caused thin cover plates to buckle. Scrapers made from files gave 15 to 25 min of service between sharpenings, HSS gave 30 to 45 min. A carbide blank brazed on (Kennametal K6) gave 14 to 16 hr of service.

Machine Artist

JOHN ROGERS, a New Hampshire machinist, began to make clay statues in plaster molds back before the turn of the century. When he died in 1904, he'd produced 100,000 statuary groups of 77 designs. They sold for from $10 to $20 a copy, and today are auction items. They made Mr. Rogers rich, and bought the Prince George Hotel in New York, still owned by his family.

Tough Toe

A. F. DAVIS, vp at Lincoln Electric, recalls that in World War I, James Lincoln went to the admiral then heading the Emergency Fleet Corporation with the suggestion that ships be welded. The admiral snorted, turned "Jim" down with the offer to kick off any weld that Lincoln could lay down. Said Lincoln, "You'd break your damned toe if you tried it!" But the admiral walked off—and ship welding waited.

"Charlie" Davis, incidentally, has just been named Advertising Man of the Year by the Copy Chasers. It's a long-overdue honor for the man who paid the first big prize for a welding paper by a welded check and who built a welded statue in the dry Arizona desert to the all-but-forgotten U. S. Camel Corps.

News of Metalworking

McGraw-Hill WORLD NEWS

ITALIAN TOOLS SOUGHT—British Ministry of Supplies agents are now in Italy to arrange for large orders of Italian machine tools required for British rearmament. Britain will supply raw materials needed to build the machinery. American experts are also in Rome to study possible use of Italian machine tool potential to supply equipment needed for western Europe defense.

RECORD U. K. EXPORTS—Almost one-twelfth of Britain's total exports of machinery and vehicles went to Latin America during 1950. Western Hemisphere took some £120 million in ships, aircraft and wheeled transport, and capital equipment, of which approximately £65.5 million went to Latin America.

BRITISH FORD SHOWN—First of the new Ford Consuls (one of two new British Ford designs) has been driven off production lines at Dagenham right on schedule. This is first fruit of Ford's £12 million postwar re-equipment program, which included nearly 700 new machine tools, of which more than 100 came from the U.S.

Few Contracts With Government Escape Renegotiation in New Act

WASHINGTON—From now on any contract you sign with the government—or any contract since Jan. 1—probably will be subject to renegotiation, even if it isn't a direct military contract.

At the present time, only contracts with the Department of Defense are subject. But a new Renegotiation Act, already passed by the House and due on the Senate floor last week, will plug loopholes in existing legislation. The new bill will extend renegotiation to contracts of Commerce Dept., Atomic Energy Commission, General Services Administration and any other agency related to national defense that the President designates.

New legislation limits renegotiation to contractors who accrue over $100,000 in government contracts during a fiscal year. It also takes official note of "five-per-centers" by making brokers who accrue over $25,000 subject to renegotiation.

• **Specific exemptions** affecting Metalworking: (1) Contracts with possessions, states or foreign governments; (2) subcontracts under exempted prime contracts.

The bill will set up a five-member independent Renegotiation Board, with no less than three civilans among its $12,500-per-year members. The President will appoint members, subject to Senate confirmation.

• **The board's powers:** Function is to lay down policies for renegotiation. It may actively renegotiate and it can authorize procurement agencies to renegotiate contracts in line with the board's policies. The board can exempt individual and general classes of contracts, even though these fall into a renegotiable category. Some it can exempt are: Contracts for secret matter which must be kept under wraps; those calling for performance in Alaska or outside territorial U. S. limits; those calling for less than 30-day performance; and those not considered worthwhile to attempt segregation of renegotiable profits.

The law sets no fixed percentage as a reasonable profit. But such factors as efficiency of the contractor, reasonable costs, extent of risk, reasonable return on net worth, and the nature of the business are taken into consideration. Adjustments are also made for taxes measured by income, other than federal taxes which are attributable to the portion of profits not deemed excessive.

• **How the law will work:** You negotiate with the government for defense contracts. The gross total of these exceeds $100,000 during your fiscal year. This brings you under the law. Within four months after the close of your fiscal year, you would submit a financial statement to the board.

If the board sees evidence of excessive profits, it then has access to your books. If investigation indicates excessive profits, you would be notified by the board and an attempt would be made to negotiate an agreement. If no agreement is reached, the board would then write an order for the amount and date for recapture by the government. Interest at 6% would accrue on the amount in dispute, from the date set.

You would have up to 90 days in which to file an appeal with the U. S. tax court, whose ruling would be final.

Rearmament Imperiled By Loss of Tool & Die Makers to Armed Services

NEW YORK—Tool and die industry efforts to preserve and extend manpower for the heavy flood of rearmament tooling now beginning to flow into contract shops were told here January 31 by Herbert F. Jahn, president, National Tool & Die Manufacturers' Association.

The nation's 3000 contract shops are losing men to the armed services, and thus imperiling the rearmament effort, through Selective Service Board failure to consider the following points noted by NTDMA officers:

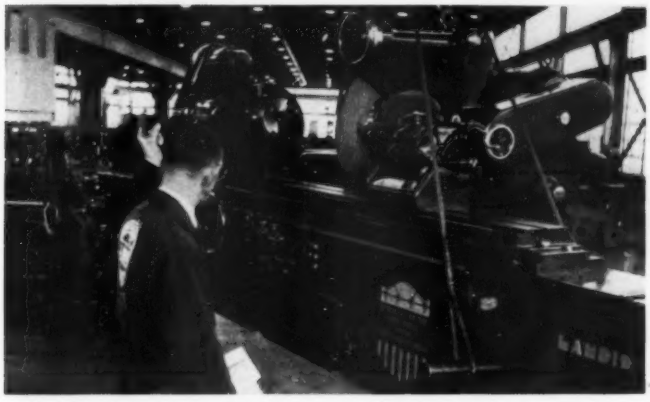
1. The supply of tool and die makers is what it was in 1941, less deaths and drop-outs from the trade. No appreciable apprentice training has been done since World War II.

2. The existing apprentices under 27, and any tool and die makers under that age, are not replaceable without long training. An apprentice is not worth much until he enters his second year at least.

3. The tool and die maker is at the end of the production procession. What one of these men does is amplified 100-fold in the production phase of rearmament.

4. Tool and die shops cannot get men except by pirating from each other, raising the cost of doing business. Shops are already working an average of 50 hr per week, and the big tooling up effort has not begun.

The manpower crisis in the contract shops has arisen in part because local draft board officials have sole power to decide if skilled workers shall be inducted, it was declared. There is no single national office to which plants can appeal for release from further depletion of their vital manpower.



ELEVEN TONS of "strength for the free world" is hoisted from assembly line to shipping department under direction of foreman L. C. Naugle at Landis Tool Co., Waynesboro, Pa. Giant grinding machine is one of first American aid products to bear new label identifying ECA-financed goods. Shield replaces previous slogan, "For European Recovery," ECA having expanded operations to include Far East as well as Marshall Plan countries of Europe

Target Pricing of Contracts Helps Solve Problem of Increasing Costs

WASHINGTON — Military procurement authorities are finding that price redetermination — or target pricing of contracts—helps solve the problem of increasing costs during a contract life. Hence, about 65% of negotiated contracts coming out of Washington have some provision for flexible costs, most of these with price redetermination clauses.

• **What it is.** Target pricing or price redetermination is nothing but the parties to a contract taking a second look at original estimates, in view of accumulated cost information. You estimate a price, negotiate a contract, and then re-price. But, in order to be subject to this, the contract must express a clause for price redetermination.

• **Maximum price type:** Where a contractor and the procuring agency cannot agree on a firm price, the contract is given a maximum price which cannot be exceeded. This figure may be based on estimates resulting out of costs figured during construction of a pilot model. It can also be computed by cost comparisons of like items.

A target date is set for price redetermination. This is usually at a point where 45 to 60% of the estimated costs have been incurred. Contractor and contracting agency then review costs incurred and then fix a new, firm price. This cannot exceed the original estimated price. The new price is based on what the cost has been, obligations incurred, reasonable profit, etc. The new figure is not subject to redetermination.

• **Incentive target price:** This is the most popular of all target priced contracts. A price is negotiated. The contract has no set ceiling above the negotiated target price. But a formula in the contract will fix the profit of the contractor by rewarding for low costs and penalizing for high costs.

Here's how this works: The Navy negotiates a contract for 50 LST's. A good, close estimate is achieved. The contractor figures a target price of $1.3-million per ship. The Navy estimates $1.2-million. The contractor's figure is set as the maximum and the Navy's figure as the target price. The contract would then include a formula that would grant the manufacturer 52% of the first $50,000 in savings below the target price; 48% of the second; 32% of the third; and 20% of the fourth $50,000 in savings. A penalty would also be set on a like basis that would levy charges against the contractor for like amounts in excess of his maximum price.

DEFENSE PRODUCTION NEWS

PROPELLER TEAM—Two General Motors divisions — Aeroproducts and Frigidaire—will team up to produce propellers for use on the Fairchild C-119C cargo plane, under a recent Air Force contract. Aeroproducts, which has been working some time on experimental phases and flight research on the propellers at its Vandalia plant, will provide the over-all engineering supervision and will also manufacture a part of the total requirements. Frigidaire's role will be to take over a major part of the production task of providing certain major components, including hubs as well as blades.

BUILD WRIGHT ENGINES—Curtiss-Wright Corp. has licensed three companies to build aircraft engines now in production at Wright-Aeronautical Corp., Wood-Ridge, N. J., Curtiss-Wright's engine division. The Wright Cyclone 7 engine has been licensed to Kaiser-Frazer Corp.; three models of the Cyclone 9 engine have been licensed to AVCO Mfg. Corp., Lycoming-Spencer Div.; and Hudson Motor Car Co. will build Cyclone 18 engines for the Navy. All engines are air-cooled piston type.

NEW AIRCRAFT UNIT—Rheem Mfg. Co. has formed an aircraft department headed by Laurence H. Cooper. A 50-acre site near the Rheem plant at South Gate, Calif., has been purchased, and a contract let for a building specially designed to handle aircraft work.

NEW PLANE PLANT—Fairchild Engine & Airplane Corp. has purchased a 32-acre tract near Farmingdale, L. I., N. Y., for a plant for defense production work. The plant will contain about 1-million sq ft and could be ready for occupancy within four months.

SHIP CONTRACTS AWARDED—Maritime Administration has awarded contracts for construction of 25 new Mariner class, fast dry-cargo ships. Five shipyards received contracts for five ships each, totaling about $40-million per yard. The breakdown with amount for each ship: Newport News Shipbuilding, $7,775,000 each ship; Ingalls, $7,898,000; Bethlehem of Sparrows Point, $7,938,000; Bethlehem of Quincy, $8,296,000; and Sun Shipbuilding, $8,399,256. Each yard will do its own procurement.

New Line Speeds Chrysler V-8 Engine Production

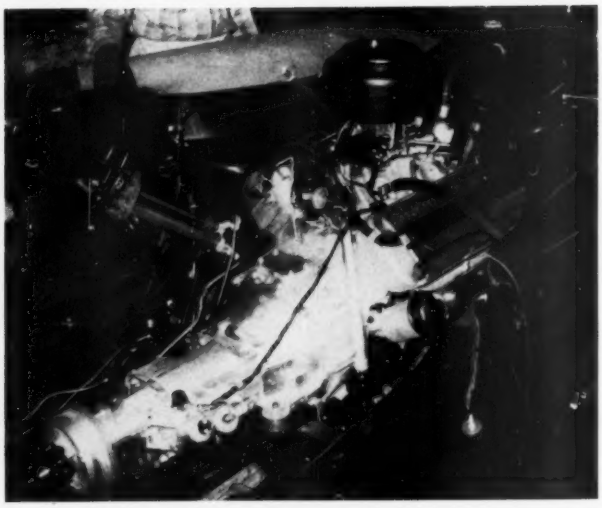
BY BEN C. BROSHEER,
ASSOCIATE EDITOR

DETROIT—Without losing a scheduled unit, in either the outgoing in-line 8 or the new "FirePower" 180-hp V-8, Chrysler shifted engine models for 1951 production. That achievement epitomizes rare tool engineering and production skill as applied to the most difficult type of model change experienced in automobile production.

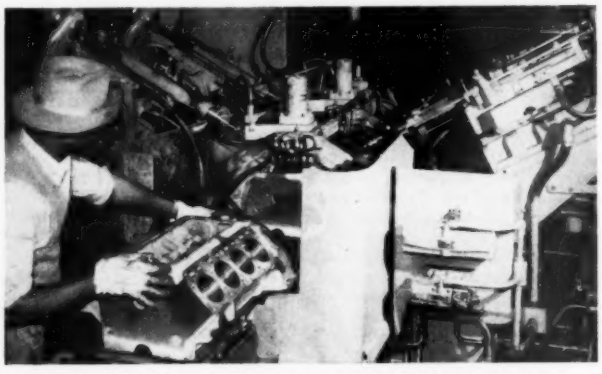
In entering the V-8 field with an engine claimed to develop more power for piston displacement than any competitive model, Chrysler came up with both engineering and machining innovations. High output is due principally to *machined* hemispherical combustion chambers and lateral valves, and to a large bore and short stroke. Dimensional tolerances and surface-finish specifications are tighter for the new FirePower engine than for the in-line engine it displaces. Dial-indicator gages and precision air gages replace go and not-go solid snap and plug gages on the machining lines. Statistical quality control charts are used where justified.

• **Production lines** for the new engine functioned 13 months after the first engineering drawings were released. Every advantage has been taken of the latest developments in machining practices. In-line processing machines with automatic work transfer devices are installed where suitable. Power elevators lift parts from one conveyor to another. Crankshaft and camshaft lines utilize multiple-wheel grinders. Special-purpose machine tools are installed at many points in order to combine operations, achieve desired quality and save floorspace.

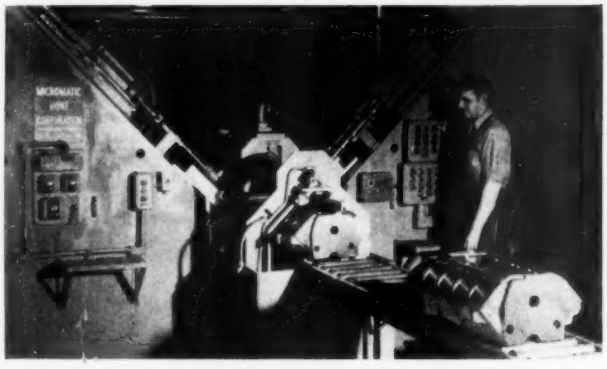
To avoid changeover problems, Chrysler set up temporary production lines for V-8 parts, using standard machines equipped with temporary tooling. But as production units arrived from machine tool builders, they were placed at proper points in the final line.



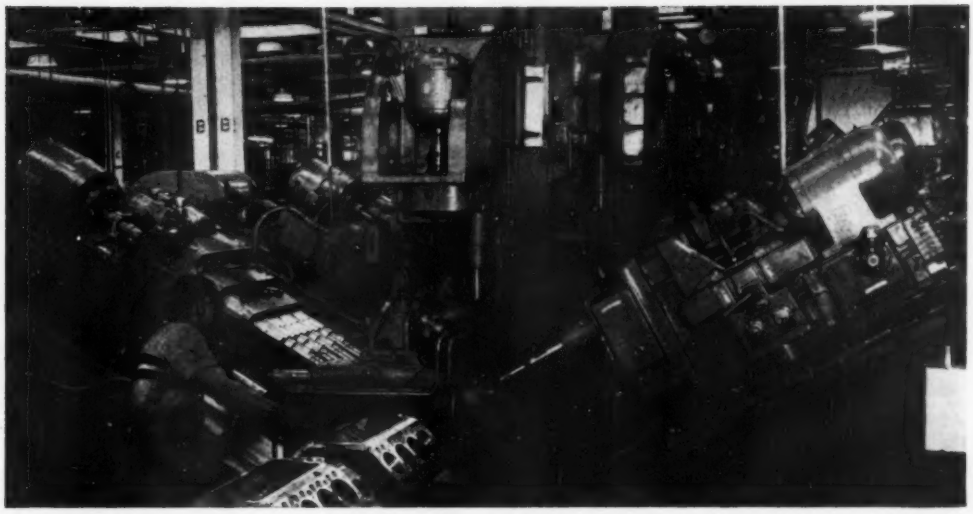
Almost ready to go, Chrysler's "FirePower" V-8 is shown in an Imperial chassis at the body-drop station of the assembly line



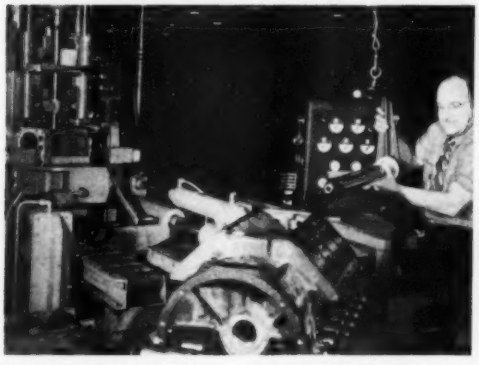
Tappet holes in block are burnished by a 4-spindle Snyder. Each pair of spindles works on a separate block; machine takes two blocks



Cylinder bores are finished with automatic sizing heads. Single-spindle Micromatic heads are used on each side of two-spindle unit



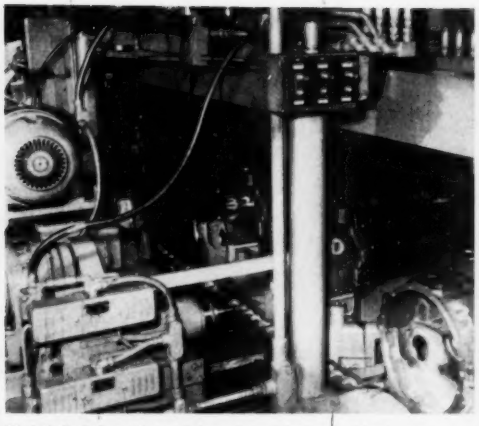
Transfer-machines process the block and cylinder heads. This 10-station Baush employs nearly 200 drills, countersinks and reamers on the block. Castings are treated with Parkolene to remove scale and embedded sand



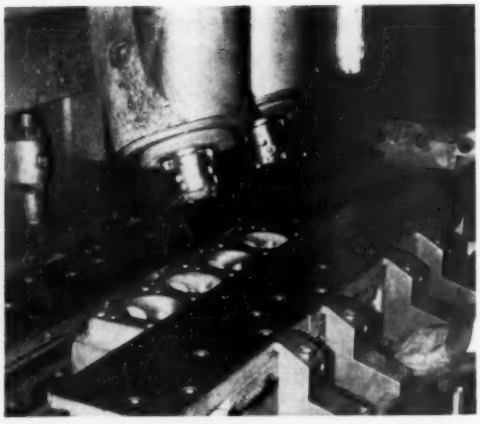
Main bearing bores are line honed with Micromatic unit, then checked with Pratt & Whitney air gage

Four cylinder bores and eight tappet holes are wire brushed in Morris machine to remove excess Lubrite

Block temperature is stabilized at 90 F in washing machine. Honed bores are marked (left) for proper one of five size classifications for selective fitting of pistons. Bores are kerosene wiped preceding Lubriting

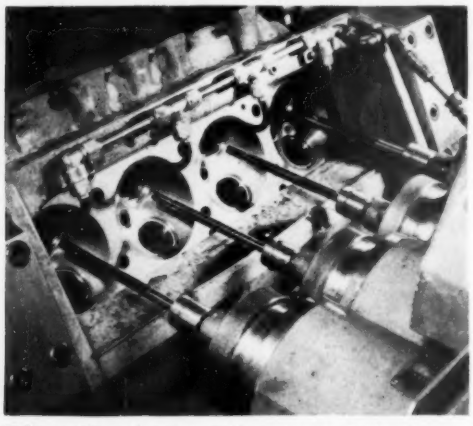


Clutch housing fits and two dowel holes in block are machined on three-station Fitchburg transfer unit



Hemispherical combustion chambers are milled two at a time by special Cincinnati with 4-blade carbide cutters

Tool setting fixtures at W. F. & John Barnes transfer machines allow presetting tools in Scully-Jones drivers



Valve seats and valve guide holes in heads are machined on 4-station New Britain transfer machine

Rocker arms are hardened by GE electronic induction unit. Heated parts drop from ferris wheel into oil

Spherical socket on one end of rocker arm is honed on special 4-station Hoern & Dilts machine

Ray Morrissey

Cyril J. Binne

C. H. Wills

C. L. Fix

Names in the News

Ray Morrissey has been named manager of the Ford Motor Company's Manufacturing Engineering, Engine & Foundry Div. Since joining Ford early last year he has been on special assignment, production manager's office, Automotive Manufacturing Operations. He was for many years associated with Cincinnati Milling Machine Co., and prior to joining Ford was for five years vice president of The Cross Co.

Herbert Gordon has been elected president, Sterling Bolt Co., Chicago, succeeding **Charles C. Gordon,** elected chairman. **Harry Dorph** has resigned from Sterling, but will continue as a director. **P. T. Phillips** was elected vice president and secretary. **Edgar B. Miller** continues as vice president and general manager. Sterling has moved its offices to 363-405 W. Erie St.

Cyril J. Binne has been named works manager, Morris Machine Tool Co., Cincinnati. For the past four years he has been field engineer for Morris, and has directed development of the Morris "Mor-Speed" automatic piston balancing machine.

Harold G. Ingersoll and **Mathew Keck** have been elected vice presidents of Borg-Warner Corp., Chicago. Mr. Ingersoll retains the presidency of the Ingersoll Steel Div., Newcastle, Ind. Mr. Keck, who has been treasurer, is succeeded in that position by **L. G. Porter,** who was treasurer of the Calumet Steel Div. **Paul J. Larsen,** former director, Office of Civil Defense, NSRB, has been named assistant to **Roy C. Ingersoll,** president of Borg-Warner. **Dr. Maurice Nelles** was named director of the Engineering Development Section, Bellwood, Ill.

C. H. Wills has been advanced from general sales manager to director of sales, Michigan Abrasive Co., Detroit. **B. S. Meade** has joined the firm as general sales manager. Mr. Meade was formerly vice president, American Swiss File & Tool Co., Elizabeth, N. J.

C. L. Fix has been named works manager, Mullins Mfg. Corp.'s Liberty plant at Warren, Ohio, which will make shells for the Army. Mr. Fix joined Mullins in May, 1950 as director of quality. **Ben Kaul** has been named technical development engineer, **Michael Theil** was named superintendent of tools and dies, **Ralph Bradley** was named general superintendent of engineering, tool design and estimating, and **Andrew W. Arnold** was named superintendent of the Warren plant tool department. Mr. Kaul spearheaded development of Mullins' new cold extrusion process of forming metal.

("*Names*" *continued on page* 242)

Ralph J. Cordiner

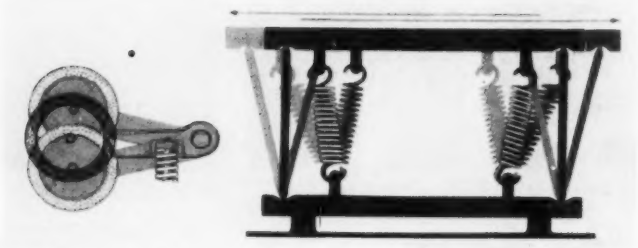
Henry V. Erben

Hardage L. Andrews

Roy W. Johnson

Ralph J. Cordiner, new president of General Electric Co., has announced election of **Henry V. Erben, Hardage L. Andrews,** and **Roy W. Johnson** as executive vice presidents to fill newly created posts with responsibilities as assigned by the GE president. They will make their headquarters at the GE executive offices in New York. Mr. Erben, a vice president, was general manager of the GE Apparatus Dept., Schenectady, N. Y. Mr. Andrews was a vice president and general manager of the Appliance & Merchandise Dept., Bridgeport, Conn. Mr. Johnson was a vice president and general manager, Affiliated Mfg. Companies Dept.

New Shop Equipment



Schematic shows (left) how chipbreakers are ground with the table locked. Moving the wheel grinds a surface parallel or angular to the cutting edge. The pivot-jointed movement of the worktable is shown at the right

Moving Table and Wheel Takes Guess Out of Tool Grinding

Dia of grinding wheel	6 in.
Peripheral speed of wheel	6000 fpm
Max. tool shank held	1½x1½in.
Horizontal table travel	2¼ in.
Vertical wheel movement	1¾ in.
Table tilt	down—20, up—7

The Arter Imperia grinder offers something new in a method of grinding carbide tools. The worktable with the tool, held by hand or in a holder, is moved across the face of the grinding wheel. Tool feed is accurately controlled by screw feed to the table. The chipbreaker grind can be made by moving the wheel up and down past the tool. Also, the worktable can be tilted to the angle required and a protractor-type toolholder locates the tool in the correct angular relation to the wheel.

By this method, tools are repeatedly ground to specified angles, angles which have become important in obtaining satisfactory performance and longer tool life between grinds.

The worktable assembly consists of a base plate, two pivot-edge side plates and a top bracket, to which is attached the tilting T-slotted worktable. Two springs hold the top bracket firmly against the side plates. The construction resembles a pivot-jointed parallelogram. Tension is alternately increased on the springs when the table is moved to and fro, thus creating an easy hand action during grinding. A graduated plate

indicates position when the table is tilted.

The spindle housing is a bracket or arm which is mounted on trunnions, and rests on a tension spring. When unlocked, it is moved up and down by hand when grinding chipbreakers.

Arter Grinding Machine Co., Worcester 5, Mass.

(MORE DATA? CIRCLE FYI 31, p. 195)

Reltool T-Slot Cutters Have Greater Side Chip Clearance

An addition to a tool line are T-slot cutters with straight shanks, for use in Reltool and other standard holders. Greater side chip clearance results in free cutting action and less breakage.

The staggered teeth are undercut and conform to the standard dimensions recently adopted by the Simplified Practice Committee. The cutters, both straight and taper shank, are available from stock in a wide range of standard sizes.

Reltool Corp., 4540 W. Burnham St., Milwaukee 46, Wis.

(MORE DATA? CIRCLE FYI 32, p. 195)

Blades Spaced Closely on Mills Without Sacrificing Strength

Line of heavy-duty milling cutters use a truncated triangular blade to provide close blade spacing without the loss of either body or blade strength. Another feature is a wedge lock which permits locking and unlocking the blade within a quarter to a half turn of an Allen wrench. Only normal hand pressure has to be applied.

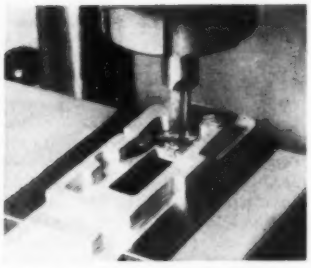
The wedge bears against the front of the blade, forcing it home into the V. Since the blades nest into broached holes there are no open slots to spring or tear open. There are no serrations to clean and fit or which set an increment of adjustment. Each blade is backed up with a heavy, fine-pitched screw which allows infinite adjustment.

These cutters, known as Series 70 are furnished with blades of HSS, super HSS cast alloy, and carbide tipped. Boring tools, hollow mills, and special tools are also available using the blade.

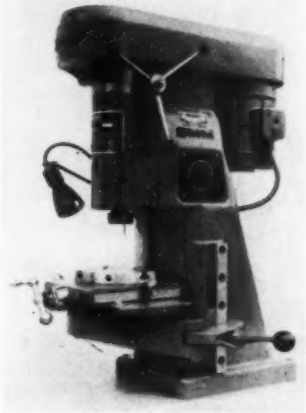
Weddell Tools Inc., Rochester 11, N.Y.

(MORE DATA? CIRCLE FYI 33, p. 195)

Materials and Parts



Using special drills, the miller can produce intricate parts and dies without templets



For bench work, it is claimed to save many man-hours in die work and yet be simple in operation

Vertical Miller Uses Eccentric Motion To Produce Square Holes

Hole sizes, width across flats	5/32 to 1 in.
Max. dist., drill to table	7½ in.
No. of spindle speeds	6
Speed range	160 to 830 rpm.
Spindle stroke	1 3/16 in.

This Swiss machine can cut multi-sided holes with flat, concave, or convex surfaces without using templets. Corners are milled to a radius one-tenth the distance across flats. Sharp corners can be obtained by a second operation using a K drill.

A rigidly supported cross-feed attachment allows vertical-milling work to be done at high speed. Convenience in setting workpieces of various shapes and sizes is afforded by the swingout table. A central hole in the table accommodates long pieces like special screws, spindles, and punches. The machine is known as the Swisma.

The Square Hole

A special three-lip cutter is fed into a round hole previously drilled or bored in the workpiece. While the tool is rotated about its own axis by a gear, an eccentric motion is imparted to it. The cutting edges are constrained to sweep a square, except for the corner radii. Permissible drilling depth equals at least twice the width of the flat.

The Inbus

Ordinary hexagon holes in recessed-head screws are subject to wear by loose-fitting wrenches. This drawback is said to be overcome by the J drill, which produces the Inbus hole in screws, spindles, etc. The hole has rounded corners and convex sides. When an Allen wrench is used, the flats on the tool rest upon a large area and do not indent or wear the hole sides.

Cutting tools, fixture with interchangeable collets, 3-jaw chuck, and the cross-feed attachment are available as extra accessories.

Gubelin International Corp., 35 W. 53rd St., New York 19, N. Y.

(MORE DATA? CIRCLE FYI 34, p. 195)

Houghton Multi-Purpose Grease Clings to Metal Surfaces

An oxidation-inhibited grease, known as Cosmolube, is said to be resistant to high heat, cold, or wet conditions. It is claimed that it clings to all metal surfaces, reducing leakage to a minimum. It is available in two consistencies, NLGI No. 1 and No. 2.

E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.

(MORE DATA? CIRCLE FYI 35, p. 195)

...INCLUDING

Hydraulic tracer for boring mills features quick changeover of the tracer ..... page 188

Power shears use a disk clutch ahead of the gears, thus there is no motion of the gear train when not cutting ..... page 189

Aluminum-forming process uses a female die made of tough rubber, saving tooling costs ... page 190

Bandsaw for cutting metal changes feed pressure automatically as material thickness changes ..... page 192

Spindle quill on jig borers feeds down on 240 steel balls, reducing maintenance ..... page 194

Hydraulic drive gives automatic control of spindle speeds for each tool in turret ..... page 198

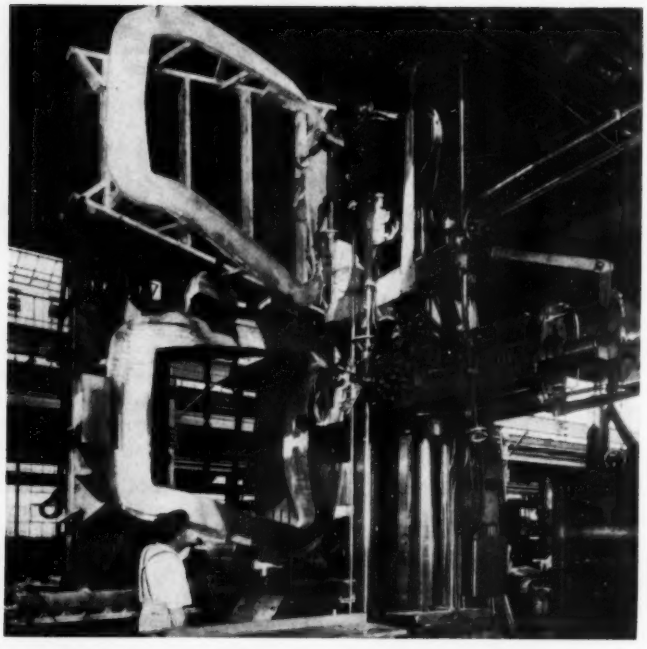
Chucking device enables workpieces to be changed quickly and gives adjustable gripping ..... page 202

NEW BULLETINS for your Shop Library, including a 60-page booklet on carbide tools and parts ..... pages 195 and 196

...and in March 5

Air tracer for lathes uses a power unit which travels with the carriage on a track at the rear of the templet support.

Automatic cutoff machine employs an opposed spindle, permitting cutting the piece without a teat.



Hydraulic Tracer for Boring Mills Operates from Central Control Panel

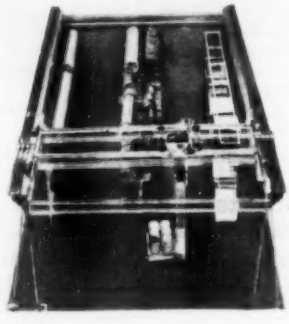
The accompanying photograph shows an auto-body die being duplicated from a plaster pattern. The work is said to be done with a minimum of effort on the operator's part. Engaging the follower takes only a few minutes, and it can be disengaged just as quickly. The tracer scans the master by means of the table power crossfeed. Table and angle plates carry both the workpiece and the model. The in-and-out feed of the boring-mill spindle and cutter is accomplished by cylinder tracer-control movements. The vertical movement of the headstock and longitudinal movement of the table is obtained through the existing leadscrews, which are driven by tracer-controlled fluid motors. The motors are engaged and disengaged by a changeover valve which throws the driving clutch into contact as directed.

All controls are operated from a centralized control panel which can be placed in any convenient location. This panel makes it possible to position the milling head wherever desired by pushing buttons. A signal light shows the exact station the unit is working in at all times.

The cycle of operations can be started or stopped as desired. Any position can be obtained by passing over any portion of the cycle not required, thus eliminating any lost or excessive travel time when not actually in a milling operation.

Turchan Follower Machine Co., Detroit, Mich.

(MORE DATA? CIRCLE FYI 36, p. 195)



Selective-Storage System Uses Only One Man

A method of storing materials provides selectivity in handling any item of any size or shape, and is adaptable to such diversified objects as rough stock, pallets, rolled goods, drums, bundles, dies, and practically any other item. It features one-man pushbutton control, and with this one attendant it delivers incoming materials to the exact position specified, or quickly selects required units or materials from storage and makes delivery at the required point.

The system consists of self-standing rack columns, designed to receive the required material and arranged on either side of narrow aisles. A crane bridge spans the entire width of the storage area and travels lengthwise on tracks to any depth. It is equipped with an overhead trolley from which is suspended an electric fork lift. The fork lift revolves to serve either side of the aisles, and pushbuttons enable the operator to control all the motions required to place or remove the items.

The system may consist of continuous shelving or any type of rack, although it may also be adapted to the handling of skid boxes or other self-stacking fixtures; it may be used with or without pallets; and the self-standing columns may be spaced at any interval required to receive the merchandise.

Chicago Tramrail Corp., 4000 W. Washington Blvd., Chicago 24, Ill.

(MORE DATA? CIRCLE FYI 37, p. 195)

End-Measuring Rods Lapped To Johansson Gage-Block Tolerance

These rods are said to serve as a dependable and accurate means for obtaining hole spacings or setting table locations on jig borers and jig mills and for other general-purpose work. They are made from selected steel and are hardened, seasoned, and lapped to Johansson gage-block tolerance of A quality 0.000004 and B quality 0.000008 in. per inch. Each set consists of pairs of 1-, 2-, 3-, 4-, 5-, and 6-in. rods and four 12-in. rods, together with two 4-in. micrometer heads in a hardwood case.

Metric sets consist of pairs of 25-, 50-, 75-, 100-, 125-, and 150-mm rods and four 300-mm rods, together with two-100 mm micrometer heads. The rods and heads can be purchased individually or in sets.

Swedish Gage Co. of America, 8900 Alpine Ave., Detroit 4, Mich.

(MORE DATA? CIRCLE FYI 38, p. 195)

Thor Impact Wrench Delivers 1850 Blows Per Minute

Designed for heavy-duty nut-setting jobs, the reversible Silver line wrench has the same basic mechanism used in earlier models except for larger parts. The cage has been designed with steel inserts to give long service.

Operating at 2000 rpm, the wrench will deliver 1850 impact blows per minute, both forward and reverse. It weighs slightly over 12 pounds and measures 11¾-in. over-all. It has a detachable dead handle for easier handling. Equipped with a ⅝-in.-square spindle, it will drive machine screws up to ⅝ in. and up to #22 wood screws.

Independent Pneumatic Tool Co., Aurora, Ill.

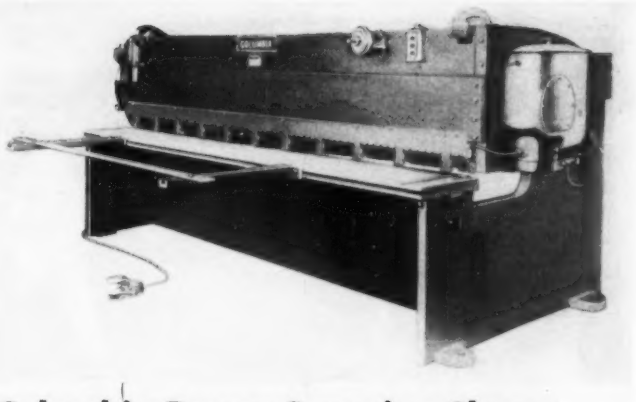
(MORE DATA? CIRCLE FYI 39, p. 195)

Magnesium Safety Tongs Prevent Die Damage

Cast from a special magnesium alloy, these tongs are designed to crush, if caught within the die opening, without inflicting any damage to the die itself. They are claimed to have the properties of lightness, strength, and rigidity. The medium-duty tongs weigh 6 oz.

Magline, Inc., Pinconning, Mich.

(MORE DATA? CIRCLE FYI 40, p. 195)



Columbia Power Squaring Shears Use Disk Clutch Ahead of Gears

Smaller units in this line are all-welded roll-steel construction, using the heavy, steel-plate chute as a structural member. Models ¼ in. x 14 ft. and larger are of assembled rolled-steel construction with the members dovetailed into each other and bolted. All members have been designed to give the assembly a safe measure of strength and rigidity without excess weight.

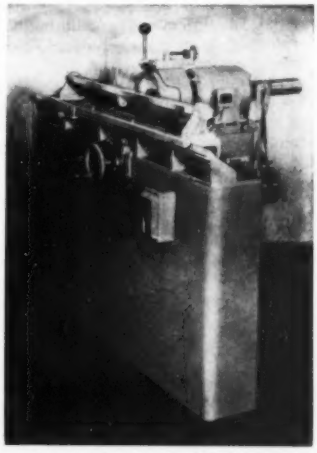
An air-operated disk clutch has been installed in the flywheel and is controlled by a solenoid through a jog switch or foot switch. Since the clutch is placed ahead of the gears, there is no motion in the gear train when the shear is not in the cutting cycle. Thus gear wear is reduced and provision is made for changing the area of tooth contact to distribute the wear. Full cutting capacity is obtained with 80-lb air pressure, but this may be lowered to provide overload protection. A spring-operated disk brake, powerful enough to stop and hold the ram in any position for blade adjustment and at top position in regular cutting operation, automatically stops the shear in event of air or power failure.

The rams are counterbalanced and have broad, flat guides scraped for running fit against outbearings in the housing. The counterbalance exerts a slight backward pressure, holding the ram securely against the guide bearings at all times, eliminating floating or rubbing of the knife, regardless of wear or clearance. Spring counterbalances are used on the smaller models while models ¼ in. x 14 ft. and larger are counterbalanced by air cylinders connected to an air surge tank.

The shears are available in a complete range of sizes and capacities of 3/16 in. up to 12 ft., ¼ in. up to 14 ft., ⅜ in. up to 20 ft., ½ in. and ¾ in. up to 14 ft., 1 in. up to 12 ft. and 1¼ in.x6 ft. All models can be equipped with a 10-ft.-range squaring arm with steel scale and hinged gage and stop, 50-in.-range front gage, light gage for scribe-line shearing and motorized front-operated micrometer back gage with 24- or 36-in.-range graduated in 64ths.

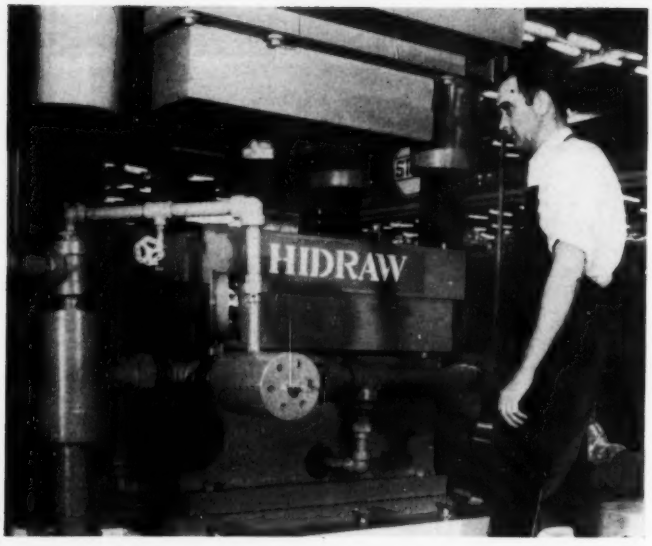
Columbia Machinery and Engineering Co., Hamilton, Ohio

(MORE DATA? CIRCLE FYI 41, p. 195)



GRINDER of 38-in. capacity will condition and grind all types of straight knives. A totally enclosed and dirt-protected mechanical transmission is used. Another feature is the automatic table and feed with adjustment from 0.0005 in. up.—*Michigan Defiance Co., Big Rapids, Mich.*

(MORE DATA? CIRCLE FYI 42, p. 195)



Aluminum-Forming Process Uses Tough-Rubber Female Die

Hidraw, another method of forming and drawing sheet-metal parts, has been developed by Convair. The process is currently being used in making B-36 bomber parts.

The only tooling necessary is a punch and press pad. The most costly part of a die (die set and female die member) is eliminated, resulting in savings of 50 to 75% over conventional tooling.

The punch and the pressure pad are mounted on the lower surface of a hydraulic press. A pad of very tough rubber on the upper surface of the press serves as the female die.

The metal to be formed is placed atop the punch and pressure pad. The press is then raised until the metal is pressed against the rubber pad. As the metal is confined against the rubber and the pressure builds up to several thousand psi, the rubber forces the metal down and around the pattern in the form required.

The pressure pad controls the shrinking of the material during the drawing operation. It is supported by pins resting on hydraulic cylinders and set to a predetermined pressure.

Parts made by this method can have punch radii much smaller than those made on conventional dies. Parts have been drawn from aluminum to a depth equal to the diameter. The thinning around the punch radii is negligible, amounting to only 2 to 6%. After a part is drawn past the point of tangency of the punch radii, the rubber applies pressure laterally as well as downward, supporting the material and preventing it from being stretched.

Consolidated Vultee Aircraft Corp., Fort Worth, Texas.
(MORE DATA? CIRCLE FYI 43, p. 195)

Hard-Chrome Plating Controlled To Tolerances of 0.0001 in.

The Model A-20 Chromaster provides facilities for hard-chrome plating metal surfaces up to 10 sq. in. at a recommended current density of 2 amps per sq. in. The unit is powered by a dry-disk power-pack selenium rectifier, and has a plating bath tank, heavy-duty rheostat, timer, ammeter, and reversing switch for stripping action. The chrome deposition can be controlled to tolerances of less than 0.0001 in.

A plating solution, known as Chromosal, operates at room temperature and is shipped to the user in a liquid, concentrated form. It is claimed to produce a plate which follows the exact characteristics of the base metal to which it is applied. The rate of deposition remains constant at 0.002 in. per hour.

It is claimed that when using this process, 1½ min. is the average time required to hard-chrome cutting tools and wear parts.

Ind. Chrome Div., Ward Leonard Electric Co., Mt. Vernon, N.Y.
(MORE DATA? CIRCLE FYI 44, p. 195)

Acetylene Torch Has Plastic Handle

Acetylene air torch, called the Sod-R-Braze, features a built-in pilot light, a diaphragm valve, and a lightweight plastic handle. The valve is designed and positioned so that the operator can turn the torch on and off, adjust the flame, and regulate the pilot light with the thumb. The fire-resistant plastic handle is grooved to provide cool operation and a firm grip.

Six tips, with individual mixers, ranging from 3/32 to ¼ in., permit soldering fine parts, sweat-fitting, and heavy heating. A regulator provided with the outfit is adjustable from 0 to 15 lb pressure, permitting pressure and volume of gas to be adjusted for each tip.

A refrigerant leak detector, which attaches to the torch handle, is available for locating leaks of halogen and other refrigerant gases. It has a reactor unit of high sensitivity.

National Cylinder Gas Co., 840 N. Michigan, Chicago 11, Ill.
(MORE DATA? CIRCLE FYI 45, p. 195)

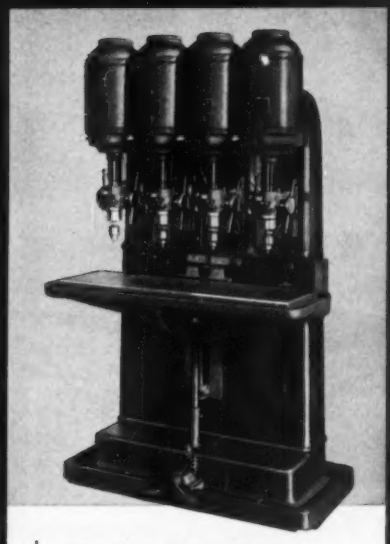
West Bacteria Inhibitor Increases Cutting-Oil Life

Additive made by West is claimed to inhibit the growth of bacteria, stabilize the emulsion and preserve the lubricating properties of the oil over its active life. It is said that in actual cases, normal use of coolants has been increased from 2 or 3 days to a period of 3 weeks when the additive is used.

For soluble-type cutting oils and coolants, the product is effective in a solution of 1 gal. to each 1200 gal. of prepared cutting oil.

West Disinfecting Co., 42-16 West St., Long Island City 1, N. Y.
(MORE DATA? CIRCLE FYI 46, p. 195)

If you drill Precision Holes



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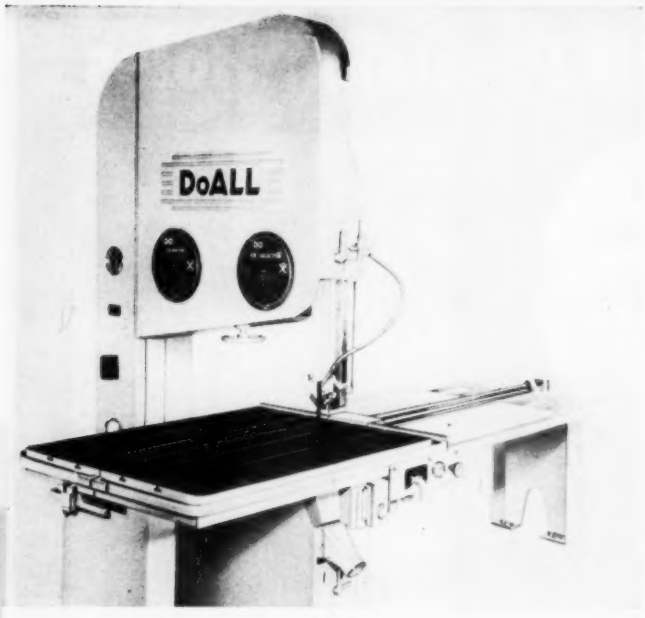

Feed Pressure Automatically Controlled by Work on Bandsaw

Throat capacity	36 in.
Work height	15½ in. up
Saw band width	1 in.
Saw speed range	40 to 10,000 fpm
Hydraulic-table dim.	40x48 in.

Correct feed pressure is automatically controlled by the resistance of the work as this bandsaw encounters changing material thickness. The table slides on 28 rollers distributed over a 36x87-in. bed. Table stroke is 36 in. with 200-lb pressure available. The infeed rate is controllable up to 18 fpm with quick return.

Known as the HP-36, the machine is well guarded and has automatic synchronized hydraulic brakes. It will cut thick sections of any ferrous or non-ferrous materials that can be machined with standard carbon-steel saw bands. In addition, it is claimed it will friction saw tough ferrous alloys such as stainless steels up to ½-in. thick.

Doall Co., Des Plaines, Ill.
(MORE DATA? CIRCLE FYI 47, p. 195)

ELECTRIC TRACTOR only 10-ft long and weighing 6 tons, pulls two huge diesels weighing half a million lb. It is said to have an ultimate draw-bar pull of 10,000 lb. Other features are 4-wheel drive, 4-wheel steer, and dual controls.—*Automatic Transportation Co., Chicago, Ill.* FYI 48

Bench Light Uses A Cast-Aluminum Shade

The tubing on this light, known as Porta-Flex, is said to be made of a steel which retains its flexibility. Another feature is the method of attaching the cast aluminum shade. The shade attaches to the tubing into which is pressed a nipple. The lamp socket is screwed onto this nipple. In this way there is no wear on either socket or shade.

A universal base allows mounting in either vertical or horizontal position. The cord is protected from oil by a case. The standard shade is for a 75-watt lamp. Price of lamp—$5.85.

Gardner Products Co., 13196 Turner Ave., Detroit 4, Mich.
(MORE DATA? CIRCLE FYI 49, p. 195)

Super Tool Makes Solid-Carbide Boring Tool

With the addition of a solid-carbide standard boring tool to their line, Super Tool now has a total of nine types of standard carbide boring tools. There is a standard model to fit each of the more popular boring machines. The tools are available from stock in all the carbide grades listed in the company's catalog, and can be produced in other suitable grades upon request.

Super Tool Co., 21650 Hoover Road, Detroit 13, Mich.
(MORE DATA? CIRCLE FYI 50, p. 195)

NUTONE and REVERE "RING the BELL"!
NuTone "SYMPHONIC" EIGHT-NOTE WESTMINSTER DOOR CHIME WALNUT FINISH COVER AND BRASS CHIME TUBES.

NUTONE'S Symphonic Door Chime, made by NuTone Incorporated, Cincinnati 27, Ohio. The company has recently added to its line Westminster Chime and Strike Clocks.

EASY polishing on centerless polishing machines is an important feature of Revere Brass Tubes.

POLISHED tubes are dipped in clear synthetic finish and up-ended to drain before baking.

• In the early days of NuTone, when the company was laying the foundation for a business that became the world's largest producer of door chimes, an important decision had to be made. A metal had to be selected for the chimes, one that would produce a soft, pleasant, resonant tone; a metal that was hard and durable; that would polish easily and retain a gleaming, luxurious surface for many years.

NuTone experimented with different metals, tested various products. Finally a Revere Brass Tube was selected, which was not surprising, because Revere itself had conducted extensive laboratory investigations into the factors responsible for pleasing tone. For the past 14 years, throughout NuTone's history, Revere Brass Tube has been used in increasing quantities. Revere has also collaborated in economy as well as quality, assisting on production problems, in the specification of multiple lengths to lessen scrap, and so on. This is a story of cooperation between two industries, and between a large company and one that used to be small, but is now the largest in its field . . . Revere is proud of the results of this long and happy association.

REVERE 150th YEAR OF SERVICE TO AMERICA

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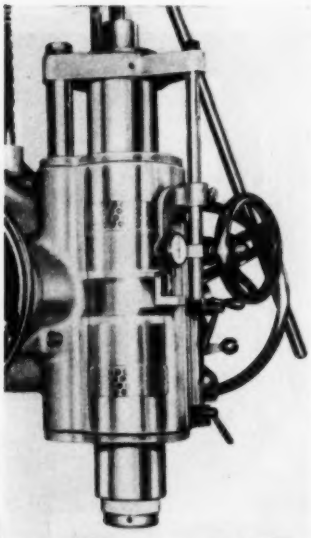


Spindle Quill on P&W Jig Borers Feeds Down on Rolling Balls

One of the problems that users of jig borers run into is to keep the conventional plain-bearing quill mounting operating to fine precision. Pratt & Whitney claims to have eliminated this maintenance with a quill running on balls.

The illustration is a phantom view of the spindle head showing the construction. Two hardened and ground steel liners are shrunk fit into the head casting, and then precision lapped in place. The spindle quill, which is hardened, ground, and draw-polished by hand, roll feeds on 240 precision balls, all preloaded, giving a total bearing pressure of 6000 lb between the quill and the hardened liners. It is claimed that despite this high bearing pressure, hand operation of the quill is so sensitive that the operator can easily feel a ⅛-in. drill feeding down in the work. A light aluminum bearing cage holds the balls in place in a staggered distribution which provides a complete bearing around the circumference of the quill.

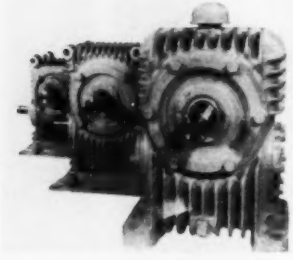
It is claimed that experimental models, with over seven years continuous service, are still functioning within their original fine limits of accuracy. It is said no adjustments or service of any kind has been necessary and no signs of wear are apparent.

Another feature which adds to the operator's convenience are new depth-measuring controls. The controls include a built-in dial indicator, which reads to 0.0005 in., and can be adjusted to any position of the 9-in. quill travel.

These features are available on Models 2A and 3B jig borers.

Pratt & Whitney Div. Niles-Bement-Pond Co., West Hartford 1, Conn.

(MORE DATA? CIRCLE FYI 51, p. 195)

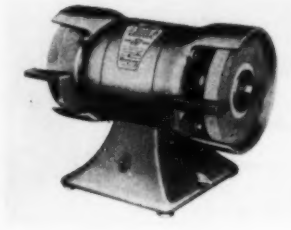


Cone-Drive Speed Reducers Use Double-Enveloping Gearing

Improved appearance and greater casting uniformity are two of the improvements put in this line. Employing double-enveloping gearing, all operating parts are directly interchangeable with former models. They are available in standard ratios of 5/1 to 50/1. Horsepower ratings range as high as 9.04 hp at 1750 rpm.

Cone-Drive Gears, Division Michigan

(MORE DATA? CIRCLE FYI 52, p. 195)



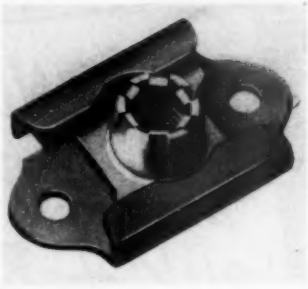
Adjustable Tool Rest Used on Lima 6-in. Grinder

The Model A utility grinder features: dynamically balanced rotors; integrally cast wheel guards; adjustable tool rests which may be tilted for angular grinding; long wearing abrasive wheels; heavy-duty toggle switch in base; and a rubber-mounted, cast-iron base.

A ¼-hp, 3450-rpm, single-phase, ac motor is used. The grinding wheels consist of one coarse and one fine grit and are 6 in. in diameter.

The Lima Electric Motor Co., Lima, Ohio.

(MORE DATA? CIRCLE FYI 53, p. 195)



Floating Anchor Combined with Locknut

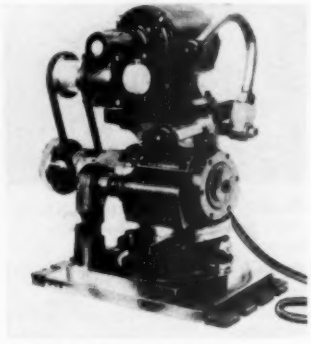
The Boot Platelok nut is combined with a light, compact, floating anchor base in this assembly.

The bases are steel, stainless steel, or aluminum alloy. Sufficient float is provided to compensate for small discrepancies in hole position, etc. The nuts are made of steel, in sizes 8-32, 10-32, ¼-28.

The locknut is formed by depressing six threaded flanges inward and downward so that they exert positive pressure against the bolt body.

Boots Aircraft Nut Corp., Stamford, Conn.

(MORE DATA? CIRCLE FYI 54, p. 195)



Speed Controlled by Rectifier in D-S Radial-Relief Grinder

Stepless speed control is attained in this grinding fixture by use of a selenium rectifier which makes possible speeds from 0 to 80 rpm by simply turning a dial. The motor used is a dc, 110-volt, gear-reduction unit offering 40 to 1 ratio and giving 44 in.-lb torque.

The fixture may be used with standard tool grinders or with the D-S stand and grinder.

D-S Grinder Div., Royal Oak Tool & Machine Co., 623 E. 4th St., Royal Oak, Mich.

(MORE DATA? CIRCLE FYI 55, p. 195)

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NEW BULLETINS

MACHINES AND ATTACHMENTS

1 GEAR CUTTING—*Rich Precision Products Co., Westfield, N. Y.* 24-page catalog deals with Maag (Swiss) gear products such as cutters, grinders, measuring and testing instruments, gears themselves, and gear-wheel pumps. Specifications and working principles are given.

2 JIG BORER—*Pratt & Whitney, Div. Niles-Bement-Pond Co., W. Hartford 1, Conn.* 12-page booklet illustrates and describes the 42 jig borer which has such features as an electromagnetic measuring system and a quill that roll-feeds on steel balls.

3 SURFACE GRINDERS—*Moelton Machine Works, Rockford, Ill.* 8-page bulletin shows a wide range of form work that the company's grinders can perform using special fixtures and contour dressers.

4 HYDRAULIC DUPLICATOR—*Tracer-Follower Machine Co., Detroit 2, Mich.* 12-page bulletin describes an attachment for any standard milling machine, boring mill, lathe, shaper, planer, or grinder. Photos show typical installations.

5 ARBORS AND ADAPTERS—*Cadillac-Jones and Co., Chicago 1, Ill.* 12-page illustrated catalog deals with accessories for milling machines such as arbors, spacing collars, adapters, centering plugs, and collet holders. Drawings and specifications completely describe the items.

6 BENDERS—*O'Neil-Irwin Mfg. Co., Lake City, Minn.* 32-page manual deals with DI-Acro bending machines and their applications. Sketches show how different bending jobs can be done the easiest.

7 TAPPING—*D. E. Preston Machinery & Tool Co., Cleveland 11, Ohio.* 8-page

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bulletin illustrates and describes the Tapmaster, a three-spindle machine using one operator. Three models are described, covering a range from ⅜- to 4-in. dia.

TOOLS AND ACCESSORIES

8 CARBIDE TOOLS — *Carboloy Co., Inc., Detroit 32, Mich.* 56-page catalog describes each style tool in detail, giving typical applications using sketches, and angles and dimensions. Also contains a technical-data section which has reinforcement tables for determining correct carbide grades and machining speeds.

9 RECESSING TOOLS — *Scully-Jones and Co., Chicago 8, Ill.* 12-page bulletin describes an automatic recessing tool in three types. Instructions give recommended setup procedure and how to grind and set the tools.

10 LUBRICANTS—*Fiske Brothers Refining Co., Newark 5, N. J.* 55-page booklet on Lubriplate oils and greases describes the product and gives recommendations as to the correct lubricant needed for each piece of equipment.

11 COLLET CHUCKS — *Hardinge Brothers, Inc., Elmira, N. Y.* 8-page bulletin presents information on Hardinge-Elsgeon speed collet chucks for toolroom and engine lathes, and grinders. Includes specifications.

12 HARDNESS TESTER—*Ames Precision Machine Works, Waltham 54, Mass.* 6-page folder illustrates and describes a portable tester that is able to test long bars and large shafts where they are, without taking samples.

13 ELECTRONIC TESTER—*Magnaflux Corp. & Co., Old Saybrook, Conn.* 6-page folder describes a unit and accessories for measurement of static and alternating forces, pressures, distances, and vibrations.

14 TURRET-TOOL HOLDERS — *Scully-Jones & Co., Chicago 6, Ill.* 4-page bulletin 7-50 describes and gives specifications on sleeves, extension sockets, and turret-tool holders. One type of sleeve can be used to salvage tools with broken tangs.

15 HOLE PUNCHING—*Weiss-Stripple Corp., N. Tonawanda, N. Y.* 8-page brochure illustrates and describes a multiple-hole punching system that permits the entire array to be made against the point.

PLANT-SERVICE EQUIPMENT

16 DUST CONTROL—*Pangborn Corp., Hagerstown, Md.* 48-page booklet treats, in three sections: exhaust hoods and piping systems; dust-collecting equipment, and exhausters and drives.

17 FLOOR MATTING — *The B. F. Goodrich Co., Akron, Ohio.* 8 pages of catalog section show the construction and uses of different types of floor matting. Includes specifications.

18 SLING CHAINS — *The Cleveland Chain & Mfg. Co., Cleveland 5, Ohio.* 6-page bulletin on wrought-iron sling chains includes safety rules, and data on chain inspection, use and care.

19 FORK TRUCKS—*Baker Ind. Truck Div., The Baker-Raulang Co., Cleveland 5, Ohio.* 8-page bulletin describes the features of the FT fork trucks in 3000- and 4000-lb capacities.

PARTS AND MATERIALS

20 HYDRAULIC CYLINDERS—*Power Flue Products Co., Detroit 7, Mich.* 64-page manual gives construction features and complete specifications on standard and differential-cut cylinders. A table gives capacities of rams in tons.

21 MOTORS — *Westinghouse Electric Corp., Pittsburgh 30, Pa.* 16-page booklet describes Life-Line type-SK dc motors and generators. It covers types, enclosures, and mountings.

22 STAINLESS-TUBE BENDING — *The Carpenter Steel Co., Alloy Tube Div., Union, N. J.* Slide chart presents data on desirable minimum radii for bending of stainless tubing and pipe.

23 SPEED REDUCERS — *The Falk Corp., Milwaukee, Wis.* 24-page booklet presents material on horizontal, right-angle reducers. Includes method of selection, hp-rating tables, and torque-capacity tables.

24 TOLERANCES — *The Babcock & Wilcox Tube Co., Beaver Falls, Pa.* Table on tolerances for round seamless carbon- and alloy-steel mechanical tubing gives permissible variations in diameter and wall-thickness.

25 BEARINGS—*Shafer Bearing Corp., Downers Grove, Ill.* 14-page bulletin illustrates and describes single- and double-row roller bearings for aircraft.

26 GASKETS — *United States Gasket Co., Camden, N. J.* 62-page catalog covers spiral-wound and metal-asbestos, and cut gaskets. Another section describes Teflon gaskets.

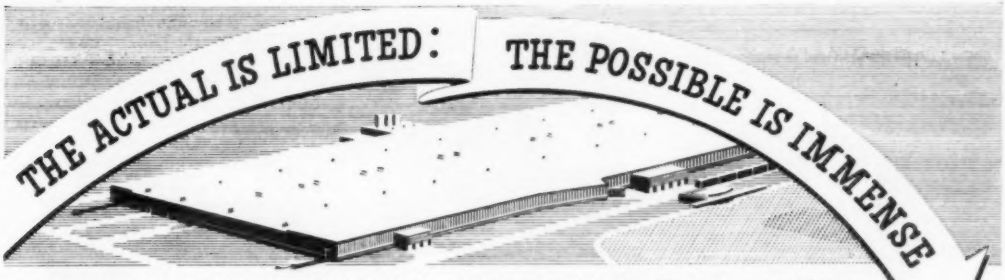
MISCELLANEOUS

27 ACCOUNTING PLAN—*Remington Rand, Inc., New York 10, N. Y.* 24-page catalog describes "The Simplified Unit Invoice Accounting Plan" through the use of the company's Kardex-Rand equipment.

28 CASTING POROSITY — *Tinsley Products Co., Sycamore, Ill.* 12-page booklet in question-answer form tells of a process for the recovery of rejects due to porosity in castings and parts.

29 MICROCASTING — *Microcast Div., Austenal Lab., Inc., Chicago, Ill.* 8-page folder reproduces 8 case histories of Microcasting applications.

30 INVENTORY CONTROL — *The Work-Factor Co., New York 17, N. Y.* 16-page booklet describes 4 ways to increase industrial production through inventory control, control of indirect expenses, etc.



NEW LINCOLN PLANT CREATED BY INCENTIVE-INSPIRED CO-ACTION IN DEVELOPING POSSIBILITIES IN PRODUCT

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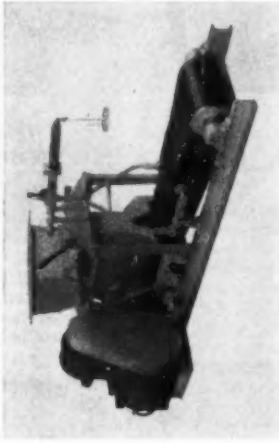
Manufacturer cuts machining time by converting to welded design

A SAVING of 0.28 man-hours per piece is now being realized in the production of the scale beam shown. By converting the design of this part to welded steel, it has become possible to pre-machine components on smaller equipment as well as eliminate some machining operations entirely.

In place of the original construction shown, the machinery member is now produced simply from a plain angle and two steel straps. The resulting greater strength of the adopted steel design is providing both improved product performance and better sales appeal. The cost of this one part alone has been cut from $2.57 to 71¢ . . . a saving of 72%.

How To Steel Design With Welding. Complete, up-to-date design data now available in new, 9th Edition, Procedure Handbook of Arc Welding Design and Practice. Price only $2.00, postpaid in U.S.A.; $2.50 elsewhere.

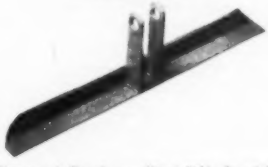


Continuous Weighing Machine *of the Schaffer Poidometer Company, Pittsburgh, Pennsylvania. Arrow points to scale beam originally used and now replaced with welded design.*

the ACTUAL

Original Construction: *Machinery beam. Cost $2.57 . . . weight 10 pounds.*

increasing the YIELD



Present Design: *Simplified with welded steel . . . Costs only 71¢ . . . weighs only 7 pounds.*

the IMMENSITY of the POSSIBLE turns out to be a COST REDUCTION OF 72%

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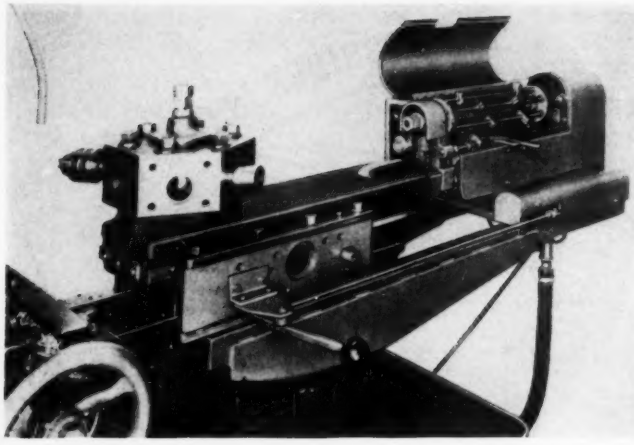
THE LINCOLN ELECTRIC COMPANY

CLEVELAND 1, OHIO



Lynn Hydraulic Drive Speeds Turret Indexing

The drive shown is an installation on a No. 2 Warner-Swasey lathe. The objective in designing this machine was to speed operations, eliminate tool breakage, and lessen operator fatigue. Some of the features are:

(1) Automatic control with full variation of speeds, whereby any desired speed can be readily set for each tool. Each time the tool indexes to position, the drive shifts to that speed automatically.

(2) Adjustable rapid tool approach to any desired point, will shift to proper cutting speed at that point, plus quick return of the turret at the end of the working stroke. Individual speed, feed, and quick return from each position.

(3) Improved cushion effect for tools, giving a better surface finish.

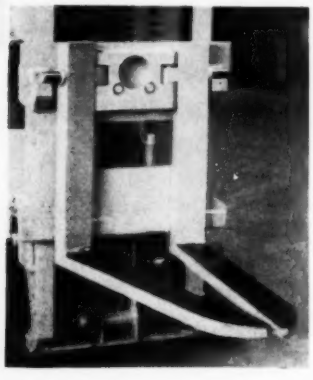
(4) Simplicity of setup without cams. Automatic stop can be set for the end of any cycle of operations.

(5) Simple controls make it possible to dwell whatever time is necessary at the end of an operation to clean up the cut before the drive goes into rapid return. Similar controls regulate the pressure for tapping and threading, so that more perfect threads can be secured.

The drive is a complete unit, and mounts directly behind the turret and is attached to it. Once installed, the turret with the unit attached can be moved to any place on the bed, without detaching the drive. It is claimed that the increase in production in the cases where the drive has been installed ranges from a minimum of 25% to a maximum of 150%.

Lynn Mfg. Co., 1551 Broadway, New York 19, N. Y.

(MORE DATA? CIRCLE FYI 60, p. 195)



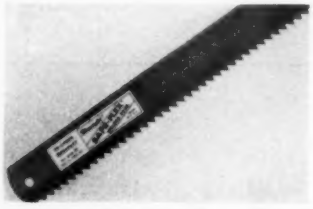
Pivoted Tines on Fork Truck Enable Loading at 45° Angle

Each tine of this fork truck can swing inward from the straight-forward position, facilitating its entrance into a pallet or under a skid. The truck may approach and handle a load at an angle of as much as 45°, depending on length of tines and width of pallet.

The head of each tine has two cross members supported horizontally in a fixture bolted to the base plate. The plate is, in turn, attached to the elevating mechanism. The inner cross member is held in the fixture by means of a vertical pin forming a hinge, and under tension of a spring. The outer member is a short length of steel bar and normally rests in a contoured flange, welded to the base plate. The tine is adjusted by moving it sideways, spring tension holding it in the proper position.

Elwell-Parker Electric Co., Cleveland, Ohio

(MORE DATA? CIRCLE FYI 61, p. 195)



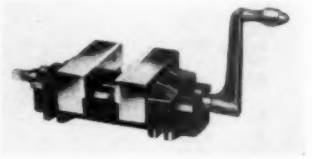
Three Grades of Hardness Used In Starrett Hacksaw Blades

A hard, high-speed steel cutting edge is integrally welded to a medium hard, strong steel center which, in turn, is welded to a tough steel back. The result is a strong blade with high impact resistance.

Called "Safe-Flex" blades, they are made in all standard sizes: 4, 6, or 10 teeth per inch.

The Starrett Co., Athol, Mass.

(MORE DATA? CIRCLE FYI 62, p. 195)



Simultaneous Movement of Jaws Speeds Vise Work

This vise locates the center of the work at a desired point on the machine table, making it particularly useful in cases where the outside dimensions of the work vary. The vise can be loaded and unloaded faster than a conventional design because both jaws open and close simultaneously.

It is so designed that the crank can be used on either end. Jaws are 6-in. wide, 1½-in. high, and open to 6¼ in. Close tolerances are held on faces, tops and sides of jaws to insure flush assembly. V-jaws are available to center varying sizes of round work.

Graham Mfg. Co., 50 Bridge St., East Greenwich, R. I.

(MORE DATA? CIRCLE FYI 63, p. 195)

quick test screens out noisy transmission gears **before assembly**

A quick test on this new Red Ring Gear Sound Tester, equipped for air clamping, tells you immediately whether or not you have any noisy gears which will need additional processing before they are assembled into automatic transmissions.

The gear being tested is slipped onto the upper arbor and its pinion onto the arbor below, with a C-washer following each. Touching the air control lever locks both in place for the sound test which is run forward and reverse at various speeds and loading. Both gear and pinion are demounted just as easily after the test.

The gears are clamped by a predetermined spring pressure for positive safety under test. The compressed air is used to release the spring pressure for quick loading and unloading.

WRITE FOR SPECIFIC DATA AND PRICES.

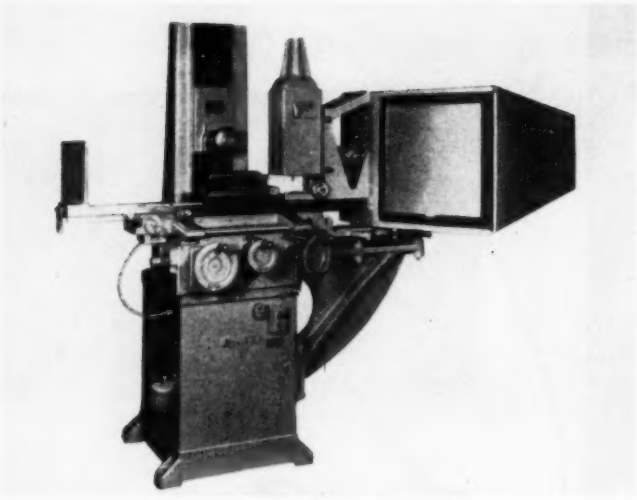
5601

SPUR AND HELICAL
GEAR SPECIALISTS
ORIGINATORS OF ROTARY SHAVING
AND ELLIPTOID TOOTH FORM

NATIONAL BROACH AND MACHINE CO.

5600 ST. JEAN . . . . . DETROIT 13, MICHIGAN

WORLD'S LARGEST PRODUCER OF GEAR SHAVING EQUIPMENT



Cleveland Contour Grinders Have Increased Rigidity

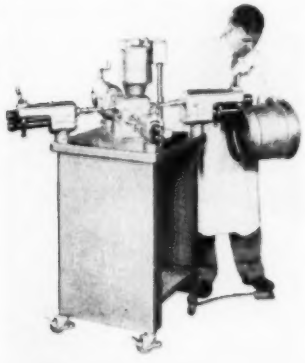
The contour-grinding machines made by Cleveland have been improved to provide increased rigidity, and to attain greater precision.

The support for the optical-projection section is a heavy-casting of aluminum alloy. Improvements within the optical section itself include: fins in the lamp housing to increase radiation and dispersion of heat; lamp-housing adjustment by hand wheel, wormgear and screw, rising and falling on dovetail ways; and a preset lens tube to insure positive focus. The longitudinal and cross-traverse movement of the optical section is on hardened steel ways and rollers, making the adjustment easier and counterbalancing the optical system.

Variable-powered longitudinal feed of the table relieves the operator of hand feeding during the rough- and finish-grind phases.

The Cleveland Grinding Machine Co., 651¼ St. Clair Ave., Cleveland, Ohio.

(MORE DATA? CIRCLE FYI 64, p. 195)



Niagara Multi-Drive Power Table For Rotary Sheet-Metal Work

A table for beading, crimping, burring, turning, and other sheet-metal operations has been developed by Niagara. The bench machines are quickly converted to power operation, substantially increasing production.

Two electric foot buttons on the end of the flexible cable and located on opposite sides of the table provide convenient means to control the driving motor. Thus the operator's cranking arm is freed and both hands can be used to accurately guide the work in the rolls.

With positions on the table for four machines, permanent setups can be made, eliminating waste time spent in hunting tools, changing rolls, and setting gages.

The power unit consists of a worm reduction unit mounted on antifriction bearings and operating in a bath of oil. A ¼-hp, 110-volt single-phase ac motor with reversing switch and overload protection is flange mounted as an integral part of the power unit. The table comes complete with 8 steel universal joints, 4 coupling shafts, and all electric equipment.

Niagara Machine & Tool Works, Buffalo, N.Y.

(MORE DATA? CIRCLE FYI 65, p. 195)

Fulmer Honing Machine For Finishing Longer Bores

A machine for finishing longer bores, from ¼ to 4 in. in diameter, has been produced by C. Allen Fulmer. Known as the Model 412, it has a working stroke of 15 in.

The machine carries a 1¼-in.-diam. alloy-steel spindle, driven by a 3-hp motor through alloy-steel reduction gears, with three spindle speeds available. Reciprocation is hydraulic with a 2-hp motor driving a Vickers pump with Vickers controls that permit reciprocating speeds from 1 to 70 fpm. The spindle and honing tools are hydraulically counterbalanced.

Standard height under the spindle nose is 40 in., with different heights optional. The standard work table carries three, ⅝-in. T-slots, and for automotive-cylinder honing a special table with an indexing cylinder-holding fixture is available to replace the standard work table. The welded-steel base carries 25 gal. of hydraulic oil and 45 gal. of coolant. The coolant is delivered to the work by a motor-driven pump. Accessories include tools from ¼-in. diam. and up.

C. Allen Fulmer Co., Cincinnati, Ohio.

(MORE DATA? CIRCLE FYI 66, p. 195)

Hjalmar Ellstrom

INVENTOR OF THE GAGE BLOCK

The achievement of perfection . . . the complete mastery of any art or craft or science . . . is a rare human accomplishment. A discovery or an invention that contributes to the progress and total welfare of all mankind is rarely the heritage left by a single man. So rare is it, indeed, that in such infrequent instances, the true facts surrounding its origin are often distorted, obscured, or even lost in the conflicting claims of others who would seek the personal worldly gains to be derived from undeserved fame.

So it was with the Gage Block. For, actually, this basic standard of measurement now used the world around was originally conceived, developed, and invented solely and entirely by . . . Hjalmar Ellstrom.

Here, briefly, is the story of his accomplishment: During the early 1890's, Hjalmar Ellstrom was employed by the government rifle factory at Eskilstuna, Sweden. He was a master craftsman . . . a man of infinite patience who took great pride in his work. He was a man of vision, too, who recognized the limitations imposed upon industry by the lack of sufficiently accurate measuring devices. So, with a then unheard of standard of precision as his ultimate goal, he alone developed and perfected his checking instruments and techniques . . . then alone he created the world's first gage block accurate to the infinitesimal millionth part of an inch.

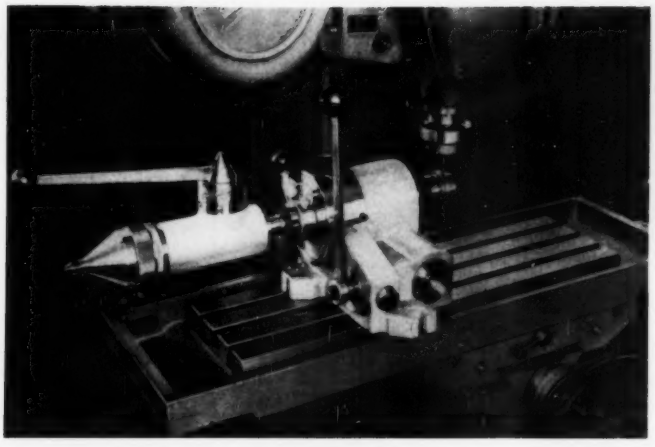
Today, though his achievement has been copied and imitated by others, his personal unqualified devotion to accuracy is the exclusive heritage of Ellstrom.

ELLSTROM . . . *measuring in millionths for three generations*

DEARBORN GAGE COMPANY

22035 BEECH STREET • DEARBORN, MICHIGAN

Originators of Chromium Plated Gage Blocks



Device Makes Chucking Quicker And Provides Adjustable Pressure

The four problems in chucking a workpiece are usually: How to assure a firm, accurate grip. How to minimize time loss in change of workpieces. How to adjust holding pressure to requirements of the work. How to achieve the last three in a tool which can be universally mounted.

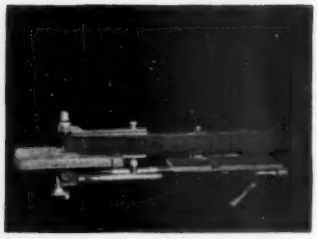
The Chuckmaster is claimed to combine in one unit the answer to these problems. Usable with collets as well as with expanding mandrels, it provides an easily adjustable gripping power of from 0 to 4½ tons, applied or released with one lever.

Where hollow spindles are available, or turrets, the unit can be attached in a manner similar to standard drawbar collet attachments. Or, it can be set up and clamped into vises and dividing heads. In general, on lathes, grinders, or other machines, pieces can be held for roughing as well as for precision finishing. The applied pressure is evenly distributed, and once set it remains constant.

There are three models available, providing capacities ranging from 0.030-in. to 24-in.-dia of work.

Karl A. Neise, 381 Fourth Ave., New York, N. Y.

(MORE DATA? CIRCLE FYI 67, p. 195)



Grant Belt Grinder can be Used on any Drillpress

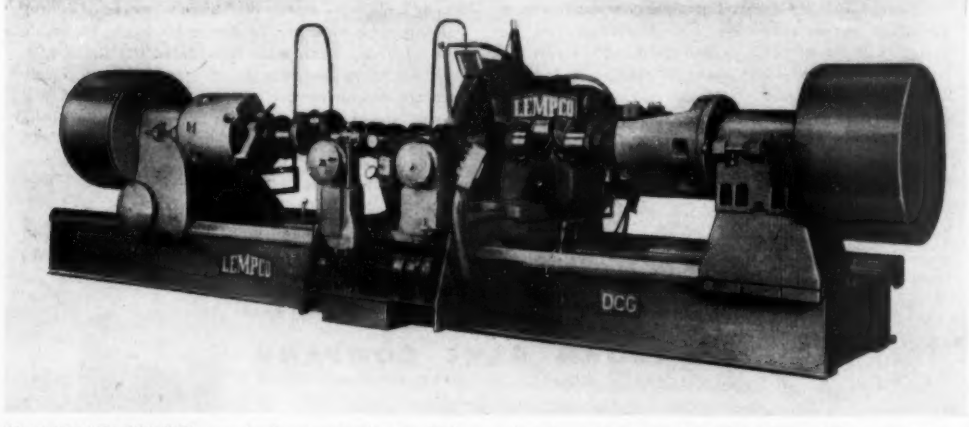
This belt grinder may be used on any drillpress and can be swung out of the way behind the machine by loosening ½-in. cap screws. It uses standard 2½x60-in. belts.

The device may be used for the grinding of concave, convex parts and radii, for deburring, for shaping and many other uses. Change of belt ratio or spindle provides speed ranges from 7000 to 36,000 rpm. An interchangeable idler wheel located between the driving pulley and the driven spindle provides continuous roll form or cylindrical grinding. This wheel may be shaped to meet various requirements such as double beveling. The table may be moved to the rear of the driving pulley for exceptionally large grinding operations. The back rest for flat grinding is adjustable.

Special equipment available includes a spindle attachment using ⅜-to 2-in.-diameter abrasive sleeves for internal surfaces.

George F. Grant Co. Inc., 15 Kempton Place, West Newton, Mass.

(MORE DATA? CIRCLE FYI 68, p. 195)



CRANKSHAFT GRINDER can chuck up and grind an 18-ft diesel shaft. The grinding wheel, 4½ ft. in diameter on the largest model, is moved hydraulically on precision ways from journal to journal at selected speeds from 1 to 35 ipm. Hydraulic controls give smooth wheel travel.—*Lempco Products, Inc., Bedford, Ohio.*

Parts for NEW "Caterpillar" Tractors machined by KENT-OWENS

New "Caterpillar" Diesel DW20 Tractor and W20 Wagon hauling heavy clay.

After five years of research, testing and proving—"Caterpillar" has announced two great new Tractors . . . and Kent-Owens Milling Machines help to save production costs.

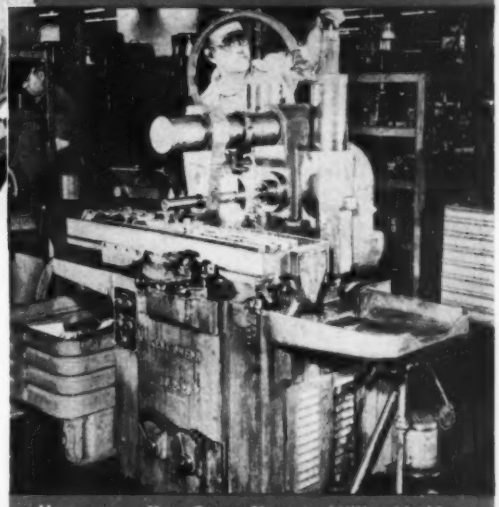
These new "Caterpillar" products are high-speed, long haul and high-capacity earthmoving machines built by Caterpillar Tractor Co., Peoria, Ill. The new units are a four-wheel Diesel tractor-wagon combination, the "Cat" DW20 Tractor with W20 Wagon; and the powerful two-wheel Diesel prime mover, the "Cat" DW21 equipped with the No. 21 Scraper.

The Kent-Owens Machine in the upper photo is milling bearing lock slots in connecting rods and caps. Due to the flexibility and ease in setting up Kent-Owens machines, the Caterpillar Company have found these machines can be easily adapted for a wide variety of operations. The machine in the lower photo is used for milling operation on compression release levers, clutch control levers, governor control levers and bell cranks. Write for Bulletins. Also, let our engineers help you with tooling and special machine requirements. Kent-Owens Machine Co., Toledo, Ohio.

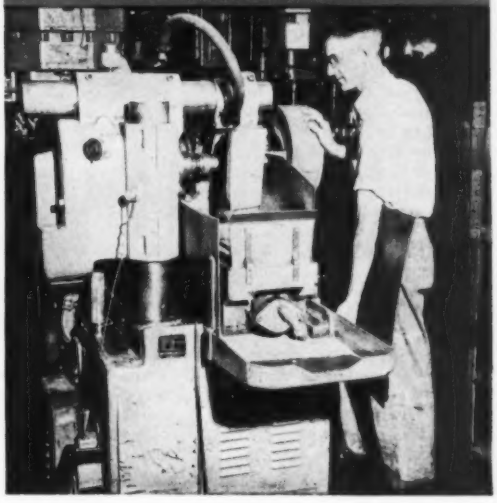
Call on

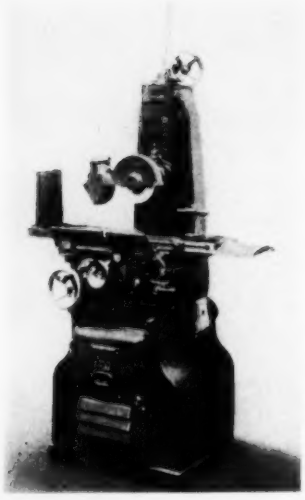
KENT-OWENS

for Milling Machines



Here are two Kent-Owens No. 2-20 Milling Machines in use at Caterpillar Tractor Co. These milling machines have 42" x 12" table, and 20" table travel.





British Surface Grinder Handles Large Workpieces

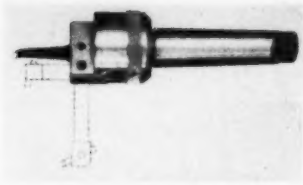
Max. distance table to wheel	12 in.
Diameter of grinding wheel	7 in.
Max. grinding length	18 in.
Max. grinding width	6 in.
Speed	360 rpm.
Hp required	1½

For toolroom or production work, this grinder has an 8x6-in. table and a large capacity between the wheel and table. Large parts may be ground when using a magnetic chuck, without reducing the diameter of the grinding wheel. Another feature which adds to its versatility is a Boneham and Turner removable spindle.

The automatic crossfeed of the table can be made to operate at each end of the table traverse. It is controlled by two stops located on a graduated dial, which is situated between the cross slide and the longitudinal-slide handwheels. The feed can be adjusted to advance the table from 0.01 in. to 0.09 in. at each reverse of the table movement.

The cross-feed mechanism can be engaged or released by adjusting the knurled knob, which is situated in the center of the dial. Arranged for motor drive, the machine has an oil-tight compartment in the base for the motor. An automatic belt tightener operates when the grinding head is raised or lowered. The automatic travels are: long, 18 in.; and cross, 6 in. The over-all table dimensions are 46x8 in.

DCMT Sales Corporation, 16½ Duane St., New York 13, N.Y., Dept. SG.
(MORE DATA? CIRCLE FYI 72, p. 195)



Maxwell Boring Tool Provides Greater Rigidity, Accuracy

The standard line of E-Z set boring tools have been improved to facilitate set-up, increase accuracy, and give greater ease of operation. The improvements include increased tool rigidity through incorporation of larger dove-tail areas, ground fit male and female dove-tail, micrometer-like adjustment which facilitates accuracy to within 0.0002-in., and elimination of distorting slots or gibs.

The tools are fabricated of chrome-nickel-molybdenum and nickel-molybdenum alloys. The steep angle threads on the scroll mechanism have been changed to modified square-type threads which reduce back-lash.

The boring tools are available in Models No. 30, No. 31, and No. 32, with maximum boring-bar capacities of ½, 1, and 1½ in., respectively. They cover a boring range of ⅜ to 20 in. Boring bars and socket keys are furnished as standard equipment

The Maxwell Co., 300 Broadway, Bedford, Ohio.
(MORE DATA? CIRCLE FYI 73, p. 195)

Material for Finishing Aluminum Used as Paint Base or Alone

Material called Protecto-Cote is provided mixed and needs only to be dissolved in water, 6 oz. per gallon. The work is immersed in the solution at 185 F, remaining in the bath about 5 minutes. No electric current is required. The equipment consists of steel tanks with facilities for heating. The solution is self cleaning, making the process a one-operation job.

It may be used alone to protect the bare metal from corrosion, or as a base for paint, where a high degree of adhesion and corrosion resistance is said to be provided at a low cost.

Chemclean Products Corp., 6½ Sixth Ave., New York 13, N. Y.
(MORE DATA? CIRCLE FYI 74, p. 195)

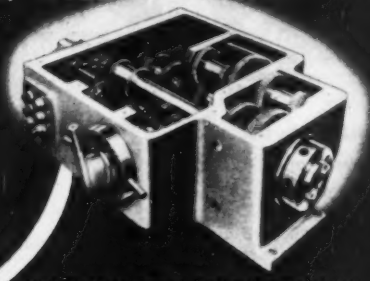
DRILLER for the drilling and countersinking of cotter-pin holes in clevis pins and screws performs at the rate of 1500 pieces per hour. The machine is fully automatic, employing 4 model KH Govro-Nelson automatic drilling units which operate simultaneously and interlocked with a Geneva-type, 8-station indexing dial and a hopper part-feeding mechanism. —*Govro-Nelson Co., 1933 Antoinette, Detroit 8, Mich.*
(MORE DATA? CIRCLE FYI 75, p. 195)

NOT JUST ANOTHER LATHE

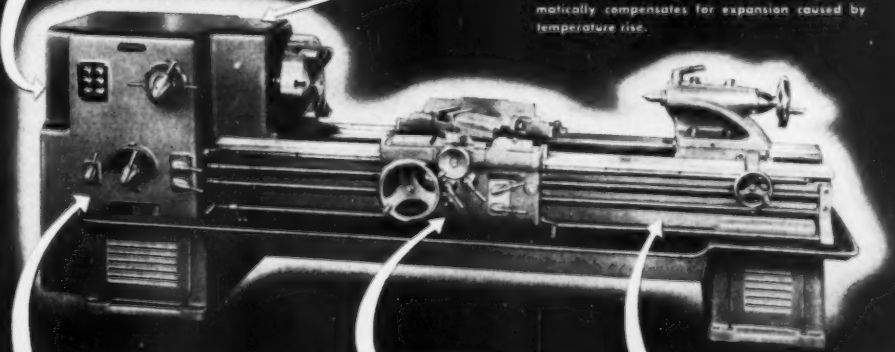
but a Sidney Lathe!

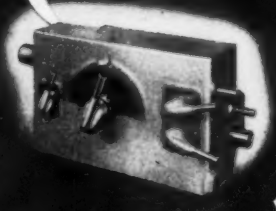
Check these features...

✓ Change gears rotate on anti-friction bearings and are mounted on fixed centers. Driving sheave is mounted on pre-loaded anti-friction bearings and is full floating on sleeve bolted to back of headstock. Drive shaft deflection is thus eliminated.



✓ All-herringbone geared headstock provides 32 pre-selective changes of spindle speeds through convenient dial control. Spindle and intermediate shafts are equipped with center bearings in addition to end bearings. Spindle mounting automatically compensates for expansion caused by temperature rise.





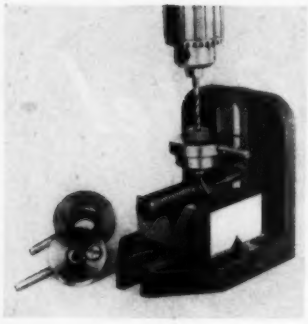
✓ Sidney's totally enclosed dial controlled gear box provides 60 changes of threads and feeds. All moving parts run constantly in oil.

✓ Controls are conveniently located for comfortable operation. Off-set compound—extra large micrometer dials—thumb screw dial lock. Notice also the four swivel hold-down bolts for added rigidity.

✓ Rigid four-wall bed construction with double cross girts spaced at 12" intervals. Casting is of semi-steel nickel mixture for close grain structure.

SIDNEY MACHINE TOOL COMPANY · SIDNEY, OHIO

Builders of Precision Machinery Since 1904



Mathewson Adjustable Jig Cuts Layout and Drilling Time

This unit may be used for drilling holes through round stock from ¼ to 2 in., and hex stock and cap screws from ¼ to 1 in. Holes for cotter pins, set screws, drive pins for bayonet joints, oil holes in tubular sections, and wiring holes in cap screws are some of the operations that can be performed. Hole diameters range from 1/16 to ½ in., using standard slip bushings.

The hardened V-block has a 90° notch for round stock on one face, and a 60° V for hex stock and cap screws on the opposite face. Adjustable stops are provided to locate the work longitudinally any distance from the end.

Centered above the V is an adjustable threaded bushing sleeve which holds the slip bushing, and also clamps the work securely to the block. Three of these sleeves are provided to accommodate slip bushings of various standard outside diameters.

Mathewson Machine Works, Inc., 2 Hancock St., North Quincy 71, Mass.

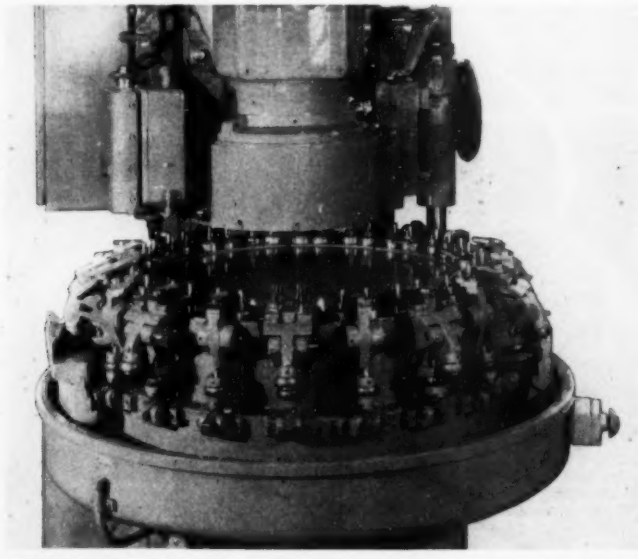
(MORE DATA? CIRCLE FYI 76, p. 195)

KSM Arc-Welding Studs Use Controlled Amounts of Flux

The quantity of flux inserted into these studs is held within ½ milligram of the correct amount. The threads are rolled and are said to be accurate, uniform and to have a mirror finish. The arc shields are uniform since they are patented and are standard with all manufacturers of welding studs.

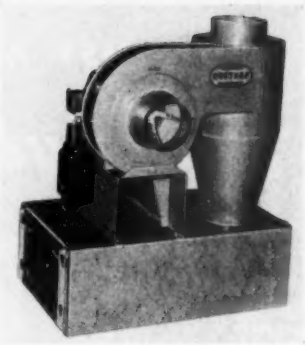
KSM Products, Inc., Merchantville 8, N. J.

(MORE DATA? CIRCLE FYI 77, p. 195)



ROTARY SURFACE GRINDER is equipped with a special fixture for grinding both ends of oil-pump gear. There are two sets of stations, one for grinding one side and the other for the opposite side. When one side is ground, the operator turns over the piece. After both sides are finished, the pieces are automatically ejected. The work is constantly checked by an automatic sizer.—*Mattison Machine Works, Rockford, Ill.*

(MORE DATA? CIRCLE FYI 78, p. 195)



Filterless Dust Collector For Outside Exhaust of Air

Model 8N50 Dustkop collector is rated at 885 cfm with 3-in. static suction. It is recommended where outside exhaust of cleaned air is required due to state regulations or to the presence of toxic fumes or vapors. Features of the unit are its portability, immediate installation, and compactness (20x30 in. floor space).

A self-clearing, paddle-wheel fan is direct-driven by a ¾-hp continuous-duty motor. The dust-laden air enters the unit at the 5-in.-diameter inlet. Dust, dirt, and chips are taken out in the cyclone separator and deposited in the dust-storage compartment which is 9x20x28 in. and comprises the base of the unit.

Aget-Detroit Co., Ann Arbor, Mich.

(MORE DATA? CIRCLE FYI 79, p. 195)

Wetting Agent for Coolant Improves Heat Dissipation

One part of a substance called Hydrodyne added to a thousand parts of coolant is said to reduce the interfacial tension of the coolant and to improve heat dissipation, give longer tool life, and increase machine speeds. The wet coolant penetrates the finest crevices where ordinary coolant droplets cannot reach.

The additive is said to improve coolants regardless of the oils used. The improved coolant is said to last longer, spread faster and splash less. Uneven wear is avoided by even cooling over entire surfaces.

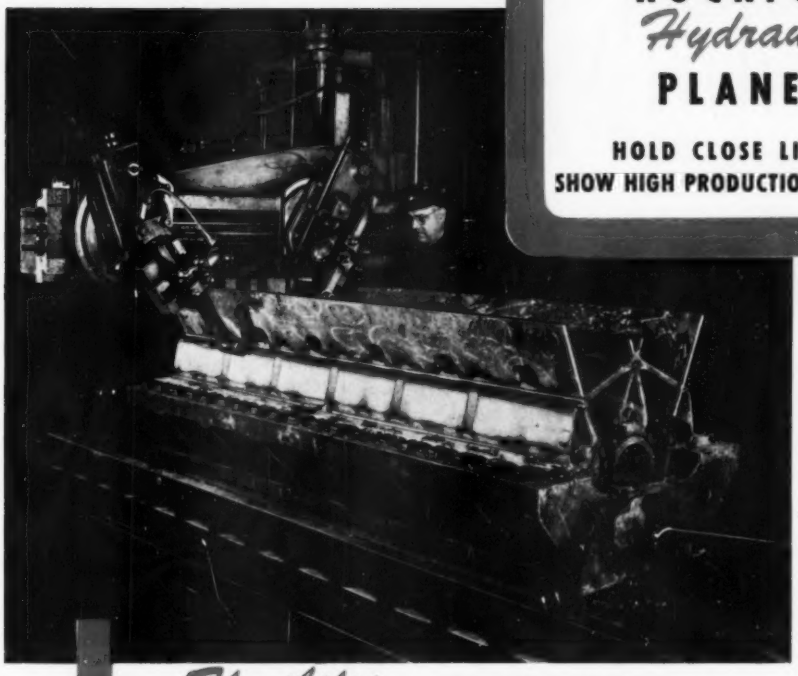
Aquadyne Corp., 220 East 42d St., New York 17, N. Y.

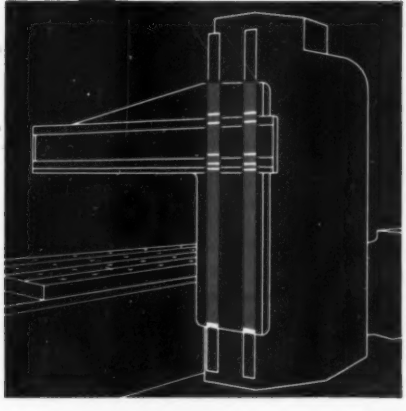
(MORE DATA? CIRCLE FYI 80, p. 195)

Furnace-control system is said for the first time to introduce rate action into an electrically actuated control. If furnace temperature, for example,

ROCKFORD *Hydraulic* PLANERS

HOLD CLOSE LIMITS...
SHOW HIGH PRODUCTION AT LOW COST





Flexibility SPEEDS WELDMENT ANGLE CUT

CROSS RAIL HEADS ADJUST EASILY

Two heads operate simultaneously for one-cut finishing of both sides of weldment on locomotive V-cylinder block at American Locomotive Co., Auburn, N. Y. Grooves are cut 3/8" x 1/2" ± .015". Operation is completed in 3-1/2 hours. Tool heads are quickly and easily positioned with micrometer dial precision screw shafts. Automatic hydro-electric clamps hold rail securely locked in position.

● **RIGID RAIL CONSTRUCTION**-The tremendous bearing surface between the cross rail and column is shown in sketch. This exclusive design, found only in Rockford Planers, insures the utmost accuracy, and is a distinct advantage over the short bearing surface of planers of conventional design.

A Rockford representative will show you how easy it is to modernize your planing operations with new Rockford Hydraulic Planers. Call him personally, or write for Bulletin 500A.

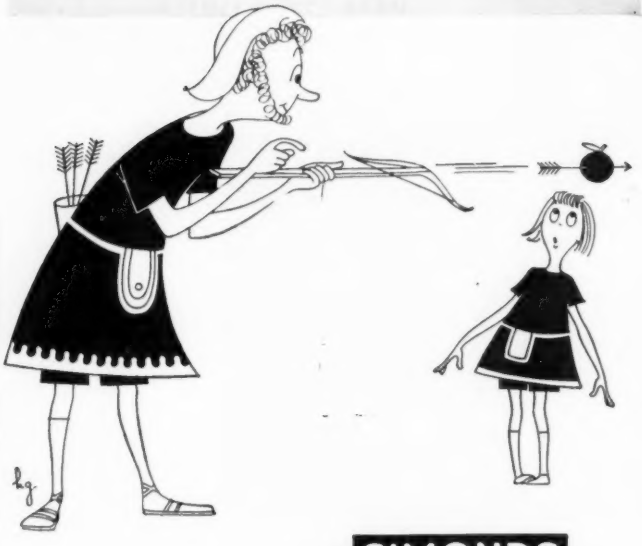
Hy-Draulic

515

ROCKFORD MACHINE TOOL CO.

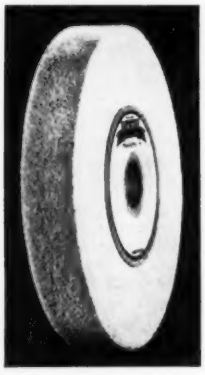
2500 KISHWAUKEE STREET • ROCKFORD, ILLINOIS

here's ACCURACY



SIMONDS ABRASIVE CO.

grinding wheels



Whether you measure grinding accuracy by Profilometer readings or comparison with master samples of ground surfaces, it's yours with Simonds Abrasive Company wheels. Why? Because Simonds wheels are accurately specified in correct grade and grains for *your* specific operations . . . accurately tested under conditions of actual use . . . and manufactured under complete Simonds control from crude abrasive to finished wheels.

Write for free Data Book describing Simonds Abrasive grinding wheels, mounted wheels and points, segments and abrasive grains. Also request name of your nearest Simonds Abrasive distributor.

SIMONDS ABRASIVE COMPANY, PHILADELPHIA 37, PA. DISTRIBUTORS IN PRINCIPAL CITIES

Division of Simonds Saw and Steel Co., Fitchburg, Mass. Other Simonds Companies: Simonds Steel Mills, Lockport, N. Y., Simonds Canada Saw Co., Ltd., Montreal, Que. and Simonds Canada Abrasive Co., Ltd., Arvida, Que.

begins to fall, rate action opens the fuel valve. The faster the drop in temperature, the wider the valve is opened. And as the rate of temperature departure decreases, rate action's effect also decreases to bring the temperature smoothly back into line. The unit has no moving parts; control action is accomplished by electronic circuits.

Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia 44, Pa.

(MORE DATA? CIRCLE FYI 81, p. 195)

Filter, known as Fulflo, removes rust, scale, dirt, free oil, and moisture from compressed-airlines. For electro-plating, it will be used for baths requiring air agitation, for lacquer rooms, and for work blowoff purposes. The filter and replacement cartridges are available from stock in ¾-in. pipe size with mounting bracket.

Hanson-Van Winkle-Munning Co., Matawan, N. J.

(MORE DATA? CIRCLE FYI 82, p. 195)

Stress and strain analyzer records phenomena up to 50 kc and amplifies these weak signals up to 35,000 times. It makes possible the simultaneous observation and recording of four separate traces on a single 5-in. oscilloscope tube, each appearing in correct time relationship without the necessity of optical alignment. Known as the H-42A Strainalyzer, it can, for example, be used to check relative pressures at four different points of a gun barrel.

Electronic Tube Corp., Philadelphia, Pa.

(MORE DATA? CIRCLE FYI 83, p. 195)

Shop boxes, made of steel, are available in five different styles. One model, the RB, can be stacked on the floor and used for bin storage. A hopper end permits easy removal of contents from boxes even when stacked. The front top rail is rounded for use as a handle. The opposite end has a drop handle.

Lyon Metal Products, Inc., Aurora, Ill.

(MORE DATA? CIRCLE FYI 84, p. 195)

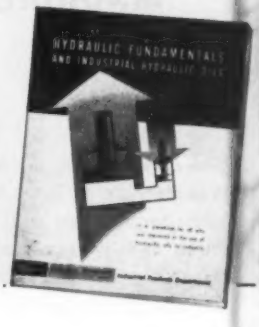
Aluminum dip uses a low-acid-concentration bath and a simple work-flow pattern. The bath is maintained by inexpensive, periodic additions of the active components to give it a long life—as much as 90 sq. ft. of aluminum surface have been processed per gallon of solution with only slight additions. It is said to be particularly effective on high purity

NEW SUN PRODUCT CLEANS HYDRAULIC SYSTEMS Without Downtime!

SUN'S NEW HYDRAULIC SYSTEM CLEANER eliminates the production loss and man-hour loss that usually go with the cleaning of equipment. This product does its work *without interrupting production*. It has the detergency to remove the sludges and gums formed by oxidation of hydraulic oil, soaps formed from coolants and cutting oils, and other contaminants. Besides permitting operations to go on undisturbed, it protects the system against further rusting once parts have been cleaned. Sun Hydraulic System Cleaner has been thoroughly "Job Proved" in cleaning up hydraulic systems of presses, machine tools, and circulating systems of a great variety of industrial equipment. It is available in viscosities suitable for any pump. Get peak performance out of *your* equipment by using Sun Hydraulic System Cleaner.

FREE!

to anyone who uses or maintains hydraulic equipment: this booklet by Sun Engineers on the fundamentals of hydraulic systems and the application of hydraulic oils. It will prove valuable as a guidebook in day-to-day work, a refresher course for engineers, or a readable instruction book for nonprofessionals.



Sun Oil Company
Dept. AM-2
Philadelphia 3, Pa.

☐ I should like a copy of "**Hydraulic Fundamentals and Industrial Hydraulic Oils.**"

☐ I want more information about **Sun Hydraulic System Cleaner.**

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SUN INDUSTRIAL PRODUCTS

SUN OIL COMPANY, PHILADELPHIA 3, PA. • SUN OIL COMPANY, LTD., TORONTO AND MONTREAL

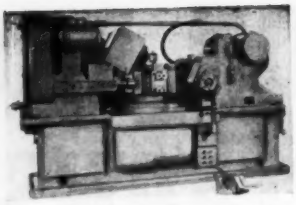
SUNOCO®

Here's what is meant by

"1·2·3"

in the

GOSS & DELEEUW AUTOMATIC CHUCKING MACHINE



The outstanding advantage of this machine is ability to handle operations on one, two or three ends of a piece simultaneously or in sequence, *without changing set-up* or rehandling. It is the only standard machine that will do this.

"1-2-3" means ability to handle work requiring machining operations on one, two or three ends simultaneously or in sequence—a method exclusive with Goss & DeLeeuw and offered on this machine.

For complete details ask for illustrated bulletin. Send samples of your work for time and cost estimates.

GOSS & DELEEUW QUALITY PRODUCT

GOSS and DE LEEUW

MACHINE COMPANY, KENSINGTON, CONN., U.S.A.

aluminum, such alloys as 2S, 3S, 52S, 61S and 150S and on the clad forms of 24S and 75S. Products for indoor applications may be dyed following dipping and anodizing, or left in natural color. Dipped articles may be color-lacquered for outdoors.

Kaiser Aluminum & Chemical Sales, Inc., 1924 Broadway, Oakland 12, Calif.

(MORE DATA? CIRCLE FYI 85, p. 195)

Industrial wheel called the Airlite Seal is said to be priced 50% below sealed-hub units now on the market. Of cast aluminum with a solid rubber tread, the unit uses roller bearings and is said to exclude virtually all foreign matter. Zerk fittings permit periodic lubrication of bearings and axle without tie-up of handling equipment. Available in from 6- to 20-in.-dia sizes.

Aerol Co., Inc., 2820 Ontario St., Burbank, Calif.

(MORE DATA? CIRCLE FYI 86, p. 195)

Industrial truck for handling long lengths of angles, pipe and tubing, or screw-machine stock is made of 4-in. structural-steel channel bolted to heavy angles. Riveted to the frame are hoisting eyes for use with overhead handling systems. Formed, steel saddles keep the bar stock on the center of the truck and provide a stable load that cannot fall off.

Lansing Co., Lansing, Mich.

(MORE DATA? CIRCLE FYI 87, p. 195)

Fan nozzles are claimed to produce more uniform coverage with less waste of spray. Side jets containing coarse droplets have been eliminated and the spray pattern made heavier in the center than at the edges of the fan. Known as the "F" Series, the nozzles include 13 discs made of long wearing stainless steel with flow rates of 1/10 to 10 gpm and spray angles of 50 to 90 deg. All discs are interchangeable in a brass base and cap assembly having a ¼-in. male pipe connection.

Bete Fog Nozzle, Inc., Greenfield, Mass.

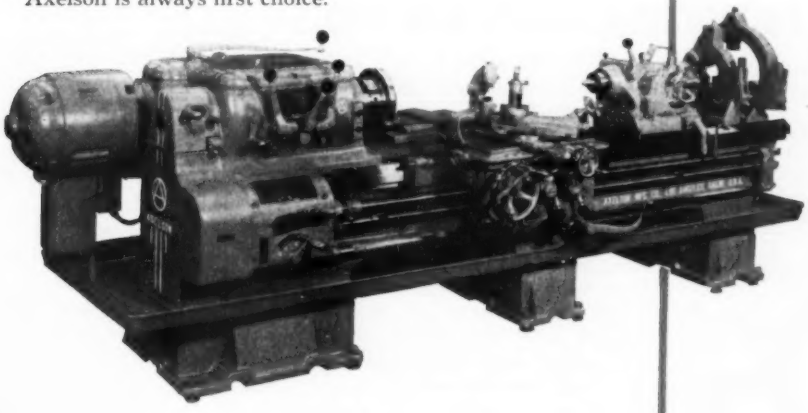
(MORE DATA? CIRCLE FYI 88, p. 195)

Pallet racks and shelves, prefabricated, eliminate bolting or welding in joining beds and uprights. C-channels on the ends of each pallet bed are fitted into the tubular uprights, locking securely in place without bolting or welding. Racks may be tiered to any height desired. There are five standard rack sizes with special channels and tube sizes

AXELSON
FIRST CHOICE
in heavy duty engine Lathes

For over a third of a century Axelson heavy duty engine lathes have been first choice of production executives.

Axelson lathes produce more work of higher quality with fewer rejects at lower unit costs... and more net profit per dollar of capital investment. Long experience of users proves it pays to choose Axelson – that's why Axelson is always first choice.



AXELSON *Lathes*

THERE IS NO ECONOMICAL SUBSTITUTE FOR QUALITY

DEPENDABLE FOR OVER A THIRD OF A CENTURY

AXELSON MANUFACTURING COMPANY Los Angeles 58, New York 7, St. Louis 16, Tulsa 1

Authorized distributors in all principal industrial centers

More than twenty years ago, Universal Products Co., Dearborn, Mich. installed McCaskey Control for production of their numerous styles and sizes of universal joints and drive shafts, gaining . . .

FAST and EFFECTIVE CONTROL of PRODUCTION, COSTS AND TOOLS

Duplicate time tickets provide data for complete control at one-writing. Repeated postings of the same information have been eliminated. One copy is quickly filed on Planning Boards above, providing a visible record of progress and work-in-process by operations.

The other copy furnishes identical data for cost records. Both are immediately available at the end of operations or shifts.

McCaskey Tool Control has cut the loss of tools, time, tool breakage, and excessive inventories. These McCaskey Controls have successfully met changing requirements over the years. They continue today to provide control of essential production operations simply and effectively.

Write for a demonstration or for descriptive folders. No obligation, of course.

THE McCASKEY REGISTER CO.
ALLIANCE, OHIO

Please send me folders describing McCaskey Production, Cost and Tool Control

Name

Position

Company

Address

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McCaskey
INDUSTRIAL CONTROLS

PRODUCTION • INVENTORY • TOOLS • COSTS • PAYROLL

supplied according to customer specifications.

American Sales Engineers, 141 West Eight Mile, Detroit 3, Mich.

(MORE DATA? CIRCLE FYI 89, p. 195)

Aluminum-solder flux can be reactivated after drying out by the simple addition of tap water. The flux can be used with rods of any commercially available brand. It can be used with an open flame and, under certain conditions, with a soldering iron. It is said to both clean the surface and deposit a coating of a nature permitting the aluminum solder to flow and adhere.

All-State Welding Alloys Co., Inc., 273 Ferris Ave., White Plains, N. Y.

(MORE DATA? CIRCLE FYI 90, p. 195)

Cleaning tissue for goggles and glasses is treated with General Electric silicone. Advantages claimed include: larger tissues at a lower cost; a lower cost and simpler, more easily filled dispenser; and tissues enclosed in sealed cartridges.

The Silicone Paper Company of America, Inc., 230 Park Ave., New York, N. Y.

(MORE DATA? CIRCLE FYI 91, p. 195)

Shaft seals are complete in the one unit, eliminating the possibility of lost parts, damaged parts, faulty assembly, or contamination of the lapped seal faces. Rubber friction members, used in the rotating and stationary elements, provide the proper driving and holding actions. Available for shaft sizes from ⅜ to 1½ in.

Sealol Corp., 45 Willard Ave., Providence 5, R. I.

(MORE DATA? CIRCLE FYI 92, p. 195)

Accordion hose for industrial vacuum cleaners stretches from a nominal length of 6 ft. to 14½ ft. without tension, yet recoils on release to an easily stowed length. Available in 1½-in. inside dia, it is said to fit all makes of standard vacuum cleaners.

Pullman Sales Corp., Room 851, 581 Boylston St., Boston, Mass.

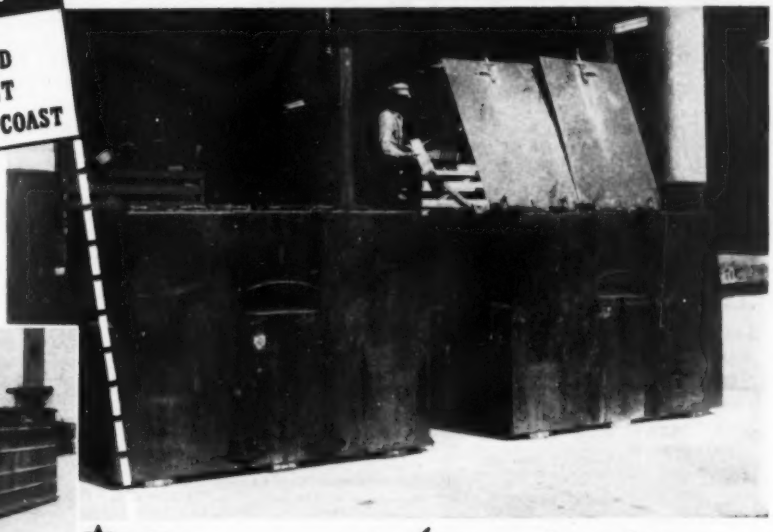
(MORE DATA? CIRCLE FYI 93, p. 195)

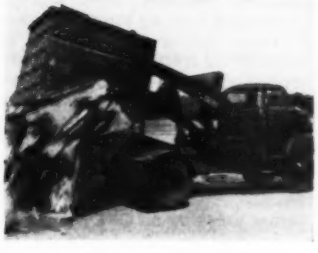
Transformer panel that swings out, facilitates the servicing and adjustment of Bob-Cat electric cable hoists. Mounted on the panel is the supply-line transformer which reduces current at the push-button control to 110 volts. By swinging this transformer and its contactors

DEMPSTER DUMPSTER SYSTEM

SERVING COST-MINDED MANAGEMENT FROM COAST TO COAST

. . . handling bulk materials of every description at phenomenal savings





CPP — COLGATE PALMOLIVE PEET CO. QUALITY PRODUCTS SINCE 1806

— recognized across the nation

. . . Colgate-Palmolive-Peet Company, well known for sound management, uses the Dempster-Dumpster System.

Colgate-Palmolive-Peet Company is among the hundreds of well managed manufacturers, both large and small, who use the Dempster-Dumpster System of bulk materials handling . . . the system recognized across the nation for its efficiency and ability to reduce costs.

You will cut cost of equipment and operation . . . you will eliminate standing idle time . . . you will eliminate re-handling of materials . . . and you will increase efficiency and good "housekeeping" by installing the Dempster-Dumpster System in your plant now! In this system, one truck-mounted Dempster-Dumpster services any required number of detachable containers—and each suited to the particular materials handled—be they bulky, light or heavy . . . solids, liquids or dust . . . trash or rubbish. Large photo above shows how containers are placed at convenient materials accumulation points and are preloaded, in this case, with waste materials. With only one man, the driver, the truck-mounted Dempster-Dumpster picks-up, hauls and dumps one pre-loaded container after another, as illustrated in three photos at left. It will pay you to investigate the Dempster-Dumpster System now! A product of Dempster Brothers, Inc.

One Dempster-Dumpster Services All Containers. . . All Designs. . . All Sizes

DEMPSTER BROTHERS, 421 Dempster Building, Knoxville 17, Tennessee

LAMINUM looks like solid metal, but it's actually made up of .002 or .003 inch layers of first quality shim stock, metallically bonded together. Peels easily with a penknife.

LAMINUM, the metal that peels, comes in a wide range of thicknesses and laminations. Here is the basic information on this versatile, money-saving material.

STANDARD STOCK 8" x 48" SHEETS
BRASS AND STEEL

Gauge	.002 inch laminations	.003 inch laminations
.006	x	
.008	x	
.010	x	x
.016	x	x
.020	x	x
.032	x	x
.048	x	x
.062	x†	x†
.094††	x†	x†
.126††	x†	x†

†Also available as half laminated brass and half solid brass.
††Available in brass only.

PROPERTIES & SPECIFICATIONS

BRASS – Raw material is a commercial half hard high brass conforming to Federal Spec. QQ-B-611a, Comp C, half hard (5/27/44). The *laminated* brass conforms to Navy Aeronautical Spec. S-122, Aeronautical Material Spec. AMS-4508, Navy Ordnance Spec. 47B6.

STEEL – The raw steel used in LAMINUM conforms to Federal Spec. QQ-S-636, Condition 2, as well as SAE-1010. There are no government specifications on the finished steel LAMINUM.

Normally all LAMINUM stampings are made by us to our customers' specifications. However, for repair and maintenance work, some of our standard stock is available from your industrial distributor.

SHIM SIZE IS VIRTUALLY UNLIMITED

We've made some shims as large as 102 inches across—and others as small as your fingernail. With special joints developed over the years, we can make any size LAMINUM shim you want.

Other than standard thicknesses and lamination arrangements can be supplied upon special order.

BABBITTED SHIMS PREVENT OIL PRESSURE LOSS

Shims for use in split bearings can be fitted with babbitt lugs to prevent oil pressure loss without shaft scoring.

LET OUR ENGINEERS HELP YOU . . . We've been designing shims for 37 years. Why not throw that problem of yours at us? There's no obligation, of course.

SEND TODAY
FOR OUR ENGINEERING DATA FILE with all the quick facts on LAMINUM plus a free sample for your inspection.

*LAMINUM is used primarily for shims. But these facts may spark other thoughts that we'd be happy to help you develop.

LAMINATED SHIM COMPANY, INC.
3102 UNION STREET GLENBROOK, CONN.

CUSTOM SHIMS

STAMPINGS

SHIM STOCK

AN·COR·LOX NUTS

out of the way, the motor brake is made readily accessible for routine adjustments. The panel eliminates the necessity for removing attachment bolts or disconnecting electrical leads, two service operations commonly required in ordinary hoists.

Cleveland Chain & Mfg. Co., Cleveland 5, Ohio.

(MORE DATA? CIRCLE FYI 94, p. 195)

Remote control for variable speed electric power drives has been developed. The unit includes a mounting bracket, reversing motor, chain and sprockets, friction clutch, chain guard, and remote "Fast-Slow" station. It is for Speed-Trol electric power drives.

Sterling Electric Motors, Inc., Los Angeles 22, Calif.

(MORE DATA? CIRCLE FYI 95, p. 195)

Safety goggles have the bridge and reinforcing bar covered with a soft-leather guard to protect the wearer against heat or cold, foreign bodies, and stray light. The side shields are also of soft leather and are permanently attached to the one-piece eyewire. This allows lenses to be replaced without removing side shields.

American Optical Co., Southbridge, Mass.

(MORE DATA? CIRCLE FYI 96, p. 195)

Finishing material, used for descaling or derusting iron or steel parts in tumbling barrels, is claimed to remove most scale in the short time of 15 to 30 minutes. Other advantages claimed are: it can be used either where parts are self-tumbled or with abrasive mediums. It is safe to handle and does not throw off fumes to cause rusting of equipment or parts in the room where it is to be used. Known as D-Scale-RW, it is an inhibited acid powder with wetting agent added. It is used in concentrations of between 4 and 16 ounces per gallon of water.

The Magnus Chemical Co., Inc., Garwood, N. J.

(MORE DATA? CIRCLE FYI 97, p. 195)

Desk calculator, known as the RMS slide-disk, simplifies the computation of standard deviations, root-mean-squares, correlation coefficients, regression lines, etc. As many as five mathematical steps are performed in one simple mechanical operation taking two seconds to complete and to an accuracy of ½% or better. It consists of a 10-in. disk that slides and rotates under a pair of vertical

Speed will be the essence of most new contracts

CUSHMAN HIGH SPEED ALUMINUM BODY
CHUCKS *and* AIR CYLINDERS

When you get down to tooling and equipment problems on new production schedules, be sure to consider the entirely new field opened by power chucks and air cylinders designed to operate smoothly and dependably at speeds up to 3500 r.p.m.

These Cushman Aluminum Body Chucks and Cylinders have been fully tested in everyday production line service. They're tough, dependable and trouble-free, require little or no maintenance, can contribute substantially to meeting high output demands. Available in limited quantity for essential needs. Anticipate your requirements and contact us at once.

THE CUSHMAN CHUCK COMPANY
HARTFORD 2, CONNECTICUT

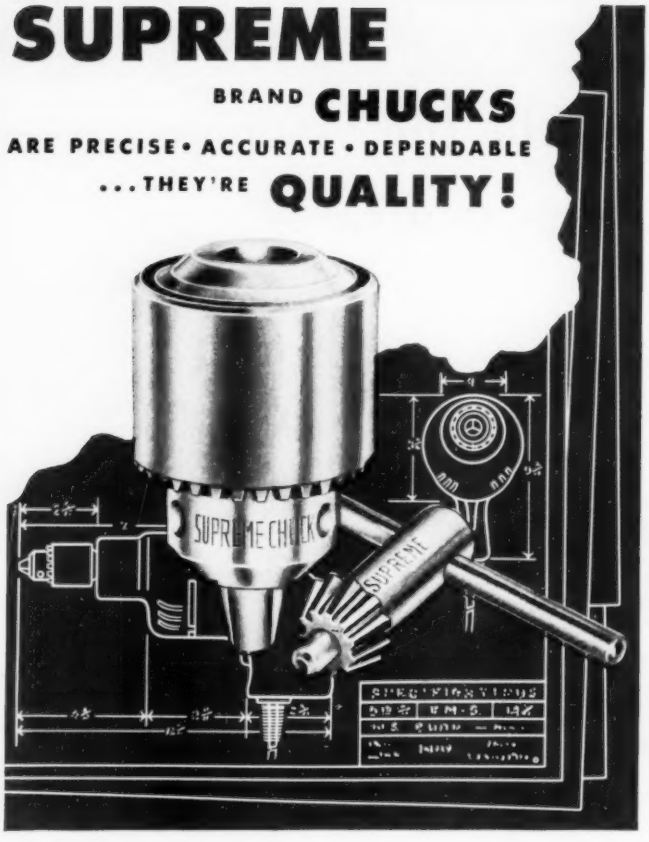
CUSHMAN CHUCKS

SUPREME

BRAND **CHUCKS**

ARE PRECISE • ACCURATE • DEPENDABLE

...THEY'RE **QUALITY!**



products equipped with

SUPREME BRAND CHUCKS

can be depended upon!

Here is a new quality chuck made by a manufacturer with an enviable reputation for precision manufacturing. Engineering skill and manufacturing "know-how" are combined to produce this chuck with outstanding workmanship.

It is precise . . . it is accurate . . . it is dependable . . . and when you receive tools equipped with a SUPREME Brand Chuck you can be assured that it is featuring one of the best chucks on the market today.

Being a newer product, its name is not as well known, but when you study its construction and exacting workmanship, you are aware of a product that is outstanding in the field.

You can assure your trade with confidence that SUPREME Brand Chucks give long, trouble-free performance . . . they are nothing but the best.

Watch for them . . . they're SUPREME.

SUPREME BRAND CHUCKS

Supreme Products, Inc., 2222 So. Calumet, Chicago, Illinois

THE CHUCK THAT LIVES UP TO ITS NAME . . . SUPREME

and horizontal scales on which a series of right triangles are formed graphically.

Graphic Calculator Co., 633 Plymouth Court, Chicago 5, Ill.

(MORE DATA? CIRCLE FYI 98, p. 195)

Rust inhibitor in the Totrust line is a fast drying, penetrating metal primer, to assure against peeling, chipping and rusting. It is said to enable re-coating in from ten to thirty minutes with all standard types of paint, rubber-base paints, vinyl coatings and spraying lacquers.

The Wilbur & Williams Co., Boston 15, Mass.

(MORE DATA? CIRCLE FYI 99, p. 195)

Assembly bins have been improved by the addition of scoops permitting them to be filled from the rear. The scoop opening allows individual bins to be refilled without removal from stacked set-ups or interruption of assembly work. Locking, all-welded construction with smooth folded edges permits stacking of bins.

Stackbin Corp., 1139 Main St., Pawtucket, R. I.

(MORE DATA? CIRCLE FYI 100, p. 195)

Lubricant additive called Protektoil is a light-viscosity heat-resisting lubricant of high film strength (38,000 psi). It has a pour point of -75 F and can be used for year-round protection of both gasoline and diesel engines. It is claimed to permit deeper draws on pressed metal without gauling, and reduce wear and operating temperatures of plain, roller or annular bearings.

The Protektoil Corp., New York, N. Y.

(MORE DATA? CIRCLE FYI 101, p. 195)

Tension tester is used for checking tensions or pressures in instruments and gages. It is claimed that because of its compactness and readability this tester is useful for tests made in both the factory and in the field. It is made with push-pull terminals, alligator clamps or insulated thong, and is supplied in capacities from 12 ounces to 12 lb.

All-Weather Springs, 140 Cedar St., New York 6, N. Y.

(MORE DATA? CIRCLE FYI 102, p. 195)

Air-fed hood has been developed that is approved by the U. S. Bureau of Mines under Class C respirator for use in toxic dust and fumes. The hood is adjustable and is made of a light-weight rubberized fabric. The air is tubed to each side of the face

Up to 35% greater production, much longer tool life

with GULF "LASUPAR" and "ELECTRO" CUTTING OILS

These new improved Gulf sulphurized cutting oils contain sulphur combined by a special Gulf Process so that it is extremely active over the entire range of a cutting operation. That's the important reason why users are able to step up feeds and speeds on tough machining jobs. They report production increases of as much as 35% after switching from conventional oils of this type.

Gulf Lasupar and Electro Cutting Oils provide excellent protection for the tool at elevated production rates—help reduce built-up edge, prevent chip welding, prolong tool life.

Because Gulf Electro Cutting Oil contains a larger percentage of this extremely active sulphur ingredient, it is recommended for the toughest machining jobs, where production and tool life are a problem.

Gulf Lasupar Cutting Oil also contains stable sulphurized fatty oil, effective in producing the fine finishes for which this quality cutting oil is so well known.

Operators everywhere welcome the new Gulf Lasupar and Electro Cutting Oils—because they get all these production advantages without the disagreeable odor ordinarily associated with sulphurized cutting oils.

Call in a Gulf Lubrication Engineer today and arrange to use these outstanding oils in your shop. Or send the coupon below for additional information.

FIFTY YEARS OF SERVICE
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PETROLEUM AND ITS PRODUCTS

Gulf Oil Corporation · Gulf Refining Company AM
3-SZ Gulf Building, Pittsburgh 30, Pa.

Please send me, without obligation, a copy of each of your new pamphlets "Gulf Lasupar Cutting Oil," "Gulf Electro Cutting Oil."

Name .....

Company .....

Title .....

Address .....

Never Before

SO MANY ADVANTAGES for HIGHEST PRODUCTION

4800 PER HOUR!
3800 PER HOUR!
2500 PER HOUR!

For Top Production

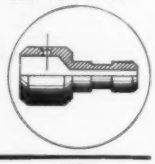
SNOW

FULL UNIVERSAL MACHINES

Air operated, electrically controlled Snow tools are establishing amazing production records daily on a wide variety of work. Just note these typical examples:

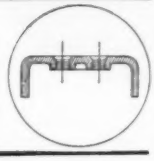
DRILLING

Crossdrill end C"T" Sink 1/16" Hole
Material—Brass
Production—4800 per hour
Fixture—#15 Vertical index
Equipment—#1-UD Drilling Machine



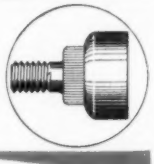
TAPPING

Tap Two #10-32 Holes
Material—Steel stamping
Production—3800 tapped holes per hour
Fixture—#14 horizontal index
Equipment—#1-UT tapping machine



THREADING

3/8"—24 Thread—1/2" Long
Material—Die Cast Aluminum
Production—2500 per hour
Fixture—#10 Drum dial
Equipment—#3-TR Threading machine



Snow air operated—electrically controlled machines have built in full universal controls that allow selection of the type of spindle cycle desired. This feature also permits instant synchronization of the standard Snow Master Fixtures. All types of air operated automatic and semi-automatic jigs and fixtures are carried in stock. Standardization permits low cost tooling—and—high production.

Simplicity of control means that set up and operation can be handled by a less experienced operator with minimum fatigue.

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Single Spindle Verticals • Two-Spindle Verticals • Two-Spindle Horizontals • Automatic Nut Tapping Machines • Drill Press Tap Heads • Automatic & Semi-Automatic Jigs & Fixtures

Submit Sample Parts for Production & Cost Estimates

and then diffused and filtered through cloth bags. Further protection is given by a soft cotton bib which acts as a baffle to keep out dust.

Chicago Eye Shield Co., 2300 Warren Blvd., Chicago 12, Ill.

(MORE DATA? CIRCLE FYI 103, p. 195)

Safety goggles feature light weight and stronger construction. The eyewire is flat instead of round, with the end pieces incorporating a friction joint with wide bearing surfaces minimizing temple drop. Screw heads are countersunk for nonsnagging. The guard arms supporting the nose pads are longer and newly shaped for added ease of adjustment.

American Optical Co., Southbridge, Mass.

(MORE DATA? CIRCLE FYI 104, p. 195)

NEW BOOKS

MECHANICAL WORLD YEAR BOOK (1951) *Published by Emmott & Co. Ltd., 31 King Street West, Manchester 3, England. Price $0.50, 508 pages*—This latest edition of a well-known yearbook contains most of the material which appeared in the earlier edition, including the information on gas turbines. However, the entire book has been revised and a new section on engineering aspects of productivity has been added. This contains much useful information on the selection of materials and machine tools, and numerous tables on the use and application of various types of cutting tools.

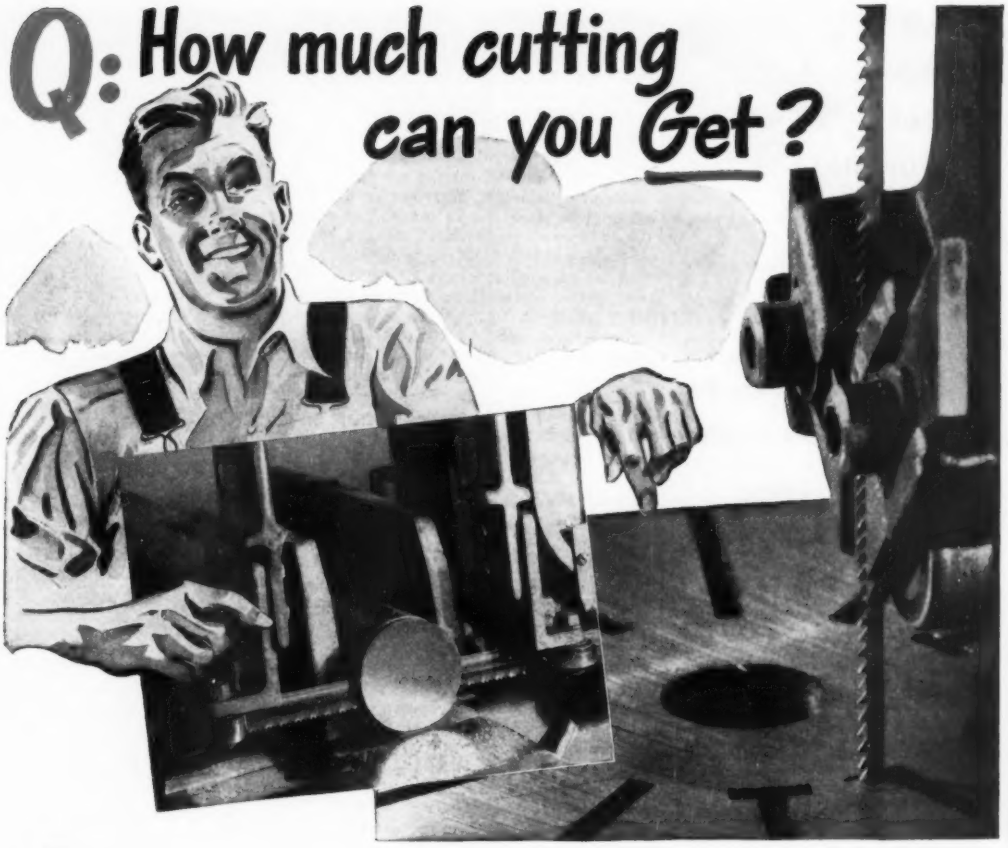
•

DIE DESIGN AND DIEMAKING PRACTICE —*Third Edition. Edited by Franklin D. Jones. 1083 pages, 6 by 9 in.; 661 illustrations. Published by The Industrial Press, 140-148 Lafayette St., New York 13, N. Y. Price, $7.*

Five new chapters have been added to this book, the cross-index expanded and a detailed table of contents, listing important subjects in each chapter, has been provided to aid the reader in finding the information he needs.

The new chapters cover the following subjects relative to sheet-metal-working dies: materials used in diemaking; the use of rubber in

Q: How much cutting can you Get?



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conjunction with press tools; pointers on the design of stampings; and heat treatment of die steels. A chapter on designing dies for powdermetal parts has also been added.

The other 22 chapters in this edition deal with a wide variety of subjects. All designs illustrated and described are said to be the work of die-design specialists, and have been successfully used in industry. The data presented on various phases of diemaking practice and die materials represent a wide collection of costly die-design experience in condensed, ready-reference form. Dies of the same general class are grouped together in chapters. In some instances, as in the case of drawing dies, these general types are further subdivided for convenient study when comparisons of similar dies are to be made.

•

Research for Industry, 1950 Annual Report—Published by Armour Research Foundation of Illinois Institute of Technology, 35 West 33rd St., Chicago 16, Ill. 54 pages.

A total of 337 research projects were active during 1950 at Armour; 182 sponsored by industrial concerns, 94 by government agencies, and 61 by the foundation itself. A large proportion of Armour work is in the field of magnetic sound recording and noise abatement. Other subjects under investigation are crystal physics, deep-hardening steels, desulfurization of iron, electropolishing of silver, jet-engine exhaust, stress analysis, precision gages, and rocket nozzles; among many others.

The purpose of this booklet is to present general information on the kind of work being done at Armour now, and to illustrate the kind of work that can be done for industry where basic research can improve products, manufacturing methods, and industrial equipment.

•

Ingenious Mechanisms for Designers and Inventors, Vol. III—Edited by Holbrook L. Horton. Published by The Industrial Press, 148 Lafayette St., New York, N. Y. 536 pages. Price $6.00.

The third in a series of compilations from the pages of *Machinery* under the same heading, this book contains such mechanisms as cams, clamps, speed changers, feeders, ejectors, and other devices useful to tool designers

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SAVE 20% in purchase price

20° Boston Gears of finer pitch may be used for equal work — average cost saving 20%

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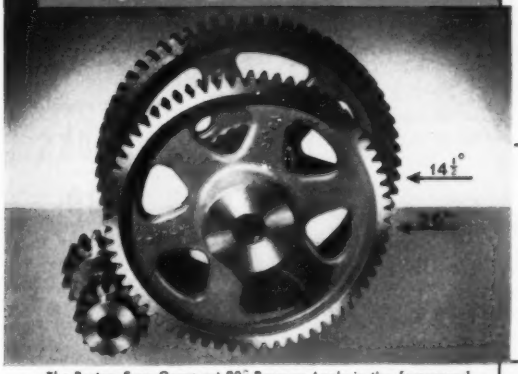

The Boston Spur Gears cut 20° Pressure Angle in the foreground do the same job as the 14½° Angle Gears in back. A 20% saving in space — 20% saving in cost.

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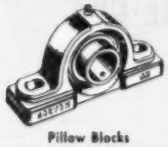
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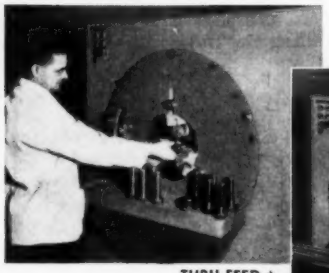

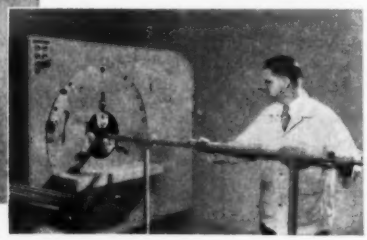

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and jig and fixture designers also.

Material is well organized under classifications of mechanism types. Although the illustrations (exclusively drawings) are generally good, there are few perspectives where they might apply better than projection drawings, and most drawings are complicated by key letters, which are designated in the text. On the whole, it is a good reference for designers who can take the time to investigate the illustrations carefully.

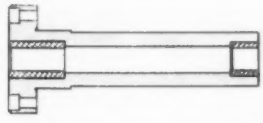
•

BIBLIOGRAPHY OF DIAMOND AS CUTTING TOOL FOR METALS AND NON-METALIC MATERIALS—*Published by Industrial Diamond Information Bureau, Industrial Distributors (Sales) Ltd., 32-34 Holborn Viaduct, London, E. C. 1 22 Pages.* This is a straight bibliography of articles on industrial cutting diamonds, including the subjects of their manufacture and use. Articles (in technical magazines from American, British and German sources) are indexed by year, and references include volume and page numbers.

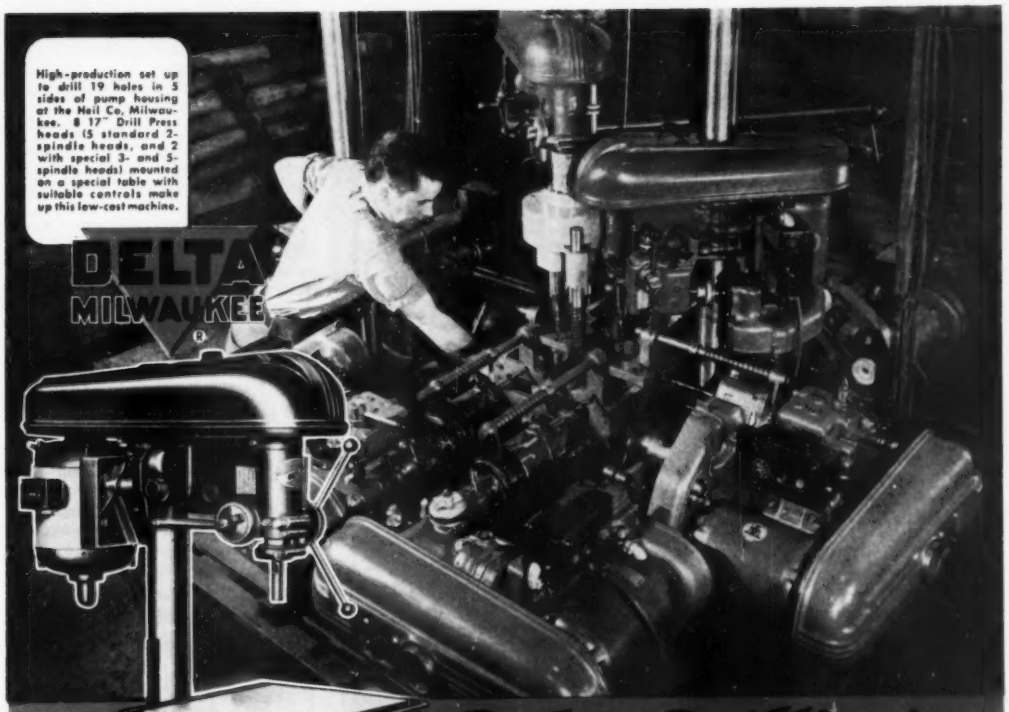
Too Many Cooks Save the Soup

A RECENT situation in our shop showed how, sometimes, two or three cooks not only *do not* spoil the production soup, but can often boil a problem down to a simple solution with their overlapping but separate thoughts on the subject.

Dan, our efficiency man, came into my office with a brainstorm showing on his face. Ivan, our toolmaker, was in tow. I am the tool engineer and draftsman combined, and Ivan and I work together closely for our mutual benefit. When a job comes up, we dope it out together, which saves time at the drawing board and speeds work in the toolroom.



Dan had a bracket in his hand—a cast-iron affair about 10 in. long with a 2-in. dia. and a flange at one end. At each end the bracket had been counterbored, and a bronze bushing was


High-production set up to drill 19 holes in 5 sides of pump housing at the Heil Co, Milwaukee. 8 17" Drill Press heads (5 standard 2-spindle heads, and 2 with special 3- and 5-spindle heads) mounted on a special table with suitable controls make up this low-cost machine.
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When you think of drilling think of Delta! Your own imagination plus the amazing adaptability of standard Delta drill presses or components can crack the toughest problem. Look what the Heil Co. did (above) with 8 Delta heads! One operator drills 19 holes in a casting—in a floor to floor time of 2.5 minutes! And at a fraction of the cost of a special-purpose machine, or a multi-station operation!

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Many new production problems will have to be met in 1951. The Oliver ACE can help you solve those problems—provide easy ways to grind those special and difficult cutters—guarantee accuracy on high speed and Tungsten Carbide work. A MACHINE THAT IS SIMPLE TO SET UP, EASY TO OPERATE, AND DEFINITELY IS FASTER ON MOST GRINDING OPERATIONS.

The ACE will handle a wide range of cutter grinding with just two simple fixtures, resulting in a SMALLER ORIGINAL INVESTMENT. WORK IS ALWAYS IN VIEW OF THE OPERATOR—NO STOOP . . . NO SQUAT . . . NO SQUINT.

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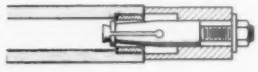
TOOL & CUTTER GRINDERS—DRILL POINT THINNERS—TEMPLATE TOOL GRINDERS—FACE MILL GRINDERS—DIEMAKING MACHINES

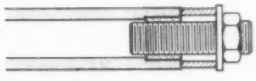
pressed in place to bottom on the shoulder. The two bearings had been line-reamed to size.

We make farm equipment, and work shipped back to us is usually overhauled; so we have a regular teardown-and-repair shop—Dan's favorite hangout. On this particular item, when the machine is torn down, the bearings in the bracket are always replaced because they invariably show wear from the high-speed spindle that runs in them. Therefore, all old brackets and production scrap from the reamers are torn down together and the bearings are replaced.

We had been using a standard bearing puller on the large bearing, then knocking out the smaller bearing with a rod. However, the puller was not too satisfactory as the bore of the bracket and the ID of the bearing were too nearly the same size to leave sufficient stock for the puller to grip. The bearing, being long, came out hard, pullers frequently slipped, and we broke more of them than the job was worth.



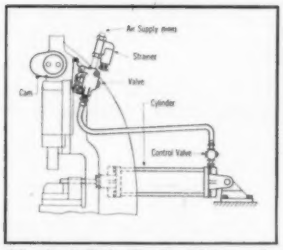
Dan had dreamed up a spring collet with a hole through it to take a conical-end expander, which was threaded at one end to take a nut. The OD of the collet would pass through the bearing, and tightening the nut on the expander would expand the shoulder behind the bearing. Continued tightening of the nut would draw the expander, collet, and bearing out of the bracket. However, we had no steel to take the proper temper for the job, and there was little reason to believe the homemade puller would be more efficient or last longer than a commercial one; and it would be more expensive.



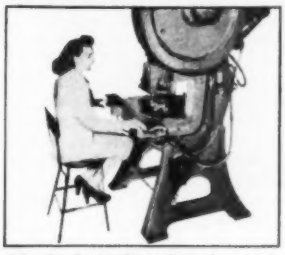
Then I remembered a kink that I'd seen in a magazine, where a simple stud puller was made by first tapping the inside of the bearing; then a stud was driven in, a short piece of pipe dropped over the stud, and a nut and washer threaded onto the stud. Tightening the nut pulled the stud, which removed the bearing.

This seemed like a good solution until Dan piped up: "If you're going to do it that way, why bother with the pipe, nut, and washer at all? All you need to do is drop a stout rod through the bracket from the other

Airways to Savings and Safety via Schrader®



Schrader Cylinder Knockout Sets—are designed for ejecting work which cannot be blown from dies by an air blast. The cam can be adjusted to actuate the knockout cylinder at any point during the press cycle.

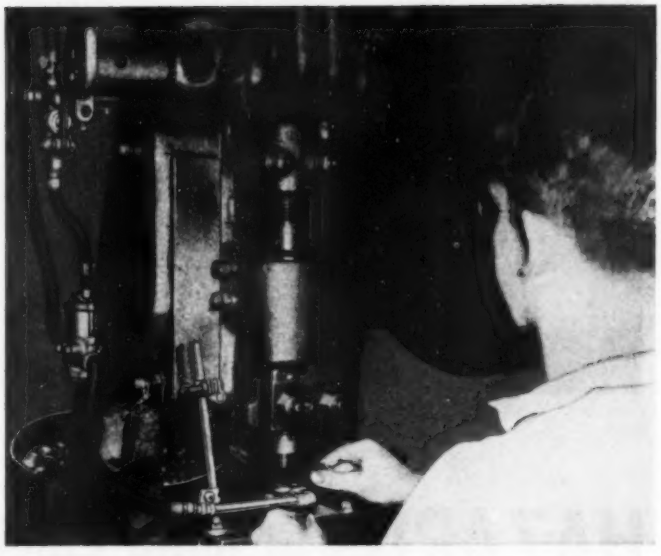


Schrader Power Press Controls—are one of the easiest ways to keep hands out of danger zones. Requires the use of two hands to operate the levers. Builds an operator-confidence that increases the flow of production.

Schrader Kick Press Controls—These controls substitute more efficient air power for foot power—thus eliminating fatigue, spoiled work. There is a Schrader control for hand operation, foot operation or both.

Air Cylinders • Operating Valves • Press & Shear Controls • Air Ejection Sets • Blow Guns • Air Line Couplers • Air Hose & Fittings • Hose Reels • Pressure Regulators & Oilers • Air Strainers • Hydraulic Gauges • Uniflare Tube Fittings

Schrader
PRODUCTS
CONTROL THE AIR



How Air Ejection of work can STEP UP Production and Safety

Hand removal of work is slow and dangerous. You can increase production as well as safety—right now—by installing Schrader Air Ejection Sets on your power press or on any other machine that has a moving member to actuate a cam or sliding tripper.

These Air Ejection Sets remove work from the die by an intermittent blast of air. Can be timed to deliver a blast from a fraction of a second to any desired length during or after the cycle. This method saves time and eliminates the hazards of hand removal.

Uses up to 90% less air. Schrader Air Ejection Sets cut down the wasteful flow of a steady air. In many cases air savings up to 90% have been effected by the adoption of Schrader Air Ejection Sets. Before you decide your compressors have reached their maximum capacity investigate how Schrader Controls cut down air waste.

Schrader Air Ejection Sets come assembled and ready to install. They are surprisingly inexpensive and pay for themselves in a matter of weeks.

If you have an ejection problem on any kind of machine, it can be solved easily by one of a number of combinations of cylinders and valves. So look over the machines in your shop. You'll see many places where these ejection sets are just the thing. Ask us to help you determine what will best fit your needs. Send us a letter outlining your particular installation, your idea, or fill out the coupon below.

Mail this Coupon Today

A. Schrader's Son
Division of Scovill Manufacturing Company, Incorporated
460 Vanderbilt Avenue, Brooklyn, N. Y., Dept. F-2

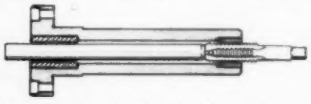
Please send me further information on

☐ Air Ejection ☐ Cylinder Knockout Sets
☐ Power Press Controls ☐ Kick Press Controls

Name _____ Title _____
Company _____
Address _____
City _____ Zone _____ State _____

end, and push it through on an arbor press."

Eureka! That was it! All we needed was tap, stud, and rod. Remove the small bearing first, then knock out the larger one with a rod that just clears the bore of the bracket and would bear against the inside edge of the bearing all around—no chance to slip, and nothing to break. But the final word came from Ivan, the toolmaker. That paragon of simplifica-



tion and standardization always looks for the easy way out—in the face of the tool engineer's inherent and almost unconscious pride in the complicated and impressive. Said he, "Why use a stud? Just leave the tap in the bearing. The push from the rod won't hurt the tap any, and it will be easier to remove the tap from the bearing after the operation than the stud—mainly because the tap has a square shank."

So there it was—five minutes of discussion and idea matching, and we had it. Dan was satisfied—no equipment cost, efficiency, and the method was surer than a stud puller. Slow—yes, but the job wasn't a high-production one, and why design production tools where hand tools will suffice? Ivan was happy—he could go back to his toolroom, secure in the knowledge that one more rush job had been averted and his jammed schedule wouldn't be jammed more And I returned to my slide rule and dividers with the thought lingering in my mind that similar cooperative gettogethers with other foremen and efficiency men would mean less needless work for Ivan and I, and less expenditures for overhead per piece for them, their departments, and for our stockholders. *Frank M. Butrick, Jr., Alma, Mich.*

HAZARDS in alloy steel
and How to Avoid Them

You may specify and buy alloy steels for years without a slip-up—without getting the wrong specification — without a breakdown or accident.

But many men and machines handle your alloys before they come to you. That means many chances for error—for a mistake—possibly with serious consequences.

The Ryerson Certified Steel Plan guards against the hazards of alloy buying — helps to eliminate errors. Here are the steps we take for your protection and guidance:

1. **Careful Selection** and analysis assures uniform high quality.
2. **Spark Testing** verifies quality, guards against mixed steels.
3. **Color Marking** and stamping gives permanent identification of type and heat.
4. **Hardenability Tests** establish obtainable mechanical properties.
5. **Pre-Shipping Check-up** matches your steel against your order's specifications.
6. **Heat Treatment Data** sent with every shipment guides you to safe, sure results without error or delay. The Alloy Certificate also verifies your steel's identification and analysis.

The value of each step has been proven by the experience of other alloy users. And all of these steps are taken for you at no extra cost. So specify and buy Ryerson Certified Alloy Steels.

Let us send you our new booklet "How to Specify and Buy Alloy Steel."

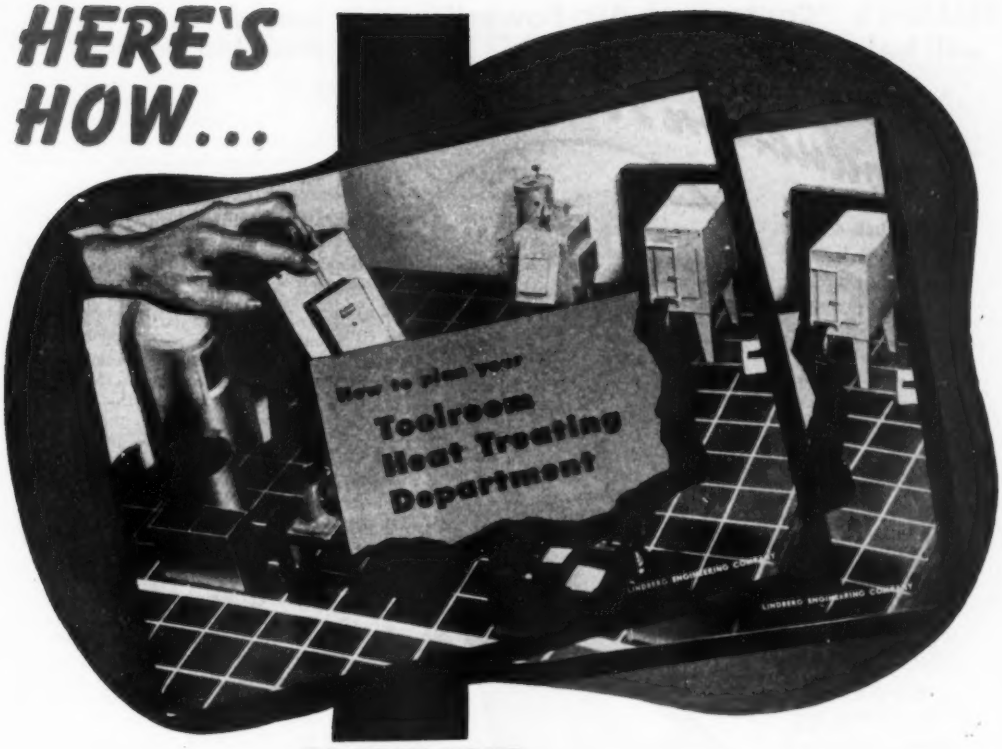
PRINCIPAL PRODUCTS

CARBON STEEL BARS—Hot rolled & cold finished
STRUCTURALS — Channels, angles, beams, etc.
PLATES — Sheared & U.M. Inland 4-Way Safety Plate
SHEETS—Hot & cold rolled, many types & coatings
TUBING—Seamless & welded, mechanical & boiler tubes
ALLOYS — Hot rolled, cold finished, heat treated
STAINLESS—Allegheny bars, plates, sheets, tubes, etc.
BABBITT—Glyco bearing metal also Ryertex plastic bearings
MACHINERY & TOOLS—For metal fabrication

RYERSON STEEL

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA • DETROIT CINCINNATI • CLEVELAND • PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS LOS ANGELES • SAN FRANCISCO

HERE'S HOW...



TO PLAN YOUR TOOLROOM HEAT TREATING DEPARTMENT

Published to assist those planning new or expanded heat treating departments. It's yours for the asking.

Material contained in this 24 page booklet, prepared by the Lindberg Engineering Company, is based upon years of experience in helping design hundreds of toolrooms . . . plus additional information gained from the 24-hour-a-day operating experiences of the toolroom heat treating department of the Lindberg Steel Treating Company, the world's largest.

It helps arrive at total costs in advance • Shows recommended department layouts • Tells how to select furnaces of proper size • Gives prices of auxiliary equipment such as tongs, quench tanks, straightening presses, hardness testers, work benches, etc. • Contains loose template pages of furnaces, quench tanks, etc. and graph paper . . . a few seconds of scissor work shows you how your department will look.

To get your copy write or call your nearest Lindberg Engineering Company office or the Lindberg home office at 2445 West Hubbard Street, Chicago 12, Illinois.

Other helps for Heat Treaters. "Heat Treating Hints"—a publication covering the practical side of heat treating with strictly "how to do it" articles. Available on request.

"Heat Treating Hints", two movies, (color and sound) bring to the screen practical articles from the printed "Heat Treating Hints". Ideal for technical associations, plant showings, schools. Write for Bookings.

LINDBERG FURNACES

BELLOWS "Controlled-Air-Power" will help you get . . .

MORE *Production Now!*

You can build *high output* **SPECIAL PURPOSE MACHINES in your own tool room**

With Bellows pneumatic devices and machine tool components usually available in your own plant, your tool room can build many needed special purpose machines, quickly . . . and at a cost low enough to warrant their use even for short runs.

Take the machine shown above, designed by a methods engineer of Ansco Camera Works, and built around a single Bellows "Controlled-Air-Power" Feed. It drills holes in a camera flash unit housing. This relatively simple and inexpensive tool room built machine increased production from 585 to 4000 parts per day.

This story isn't unusual. It's typical of hundreds of case histories in our files, from nearly every industry, in plants large or small.

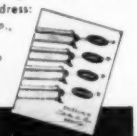
These unique "packaged" pneumatic devices feed tools with the highly sensitive touch of a skilled operator; they feed parts quickly and accurately to machines; clamp and hold parts in position, release and eject them; and they do all these automatically with either timed electrical control or mechanical synchronization.

BELLOWS FIELD ENGINEERS CAN HELP

Bellows Field Engineers are located in every major industrial area. They are listed in their local phone book under "The Bellows Co." These men know production. They will be glad to work with your engineers and production men in applying "Controlled-Air-Power" to your operations.

The effective use of Bellows Equipment is limited only by the ingenuity of the tool engineer

May we send you the complete case history mentioned above (FF50-656) and a copy of "Faster, Safer, Better Production"? It's worthwhile reading. No cost. No obligation. Address: The Bellows Co., Dept. AM251 Akron, 9, Ohio



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The Bellows Co.

AKRON 9, OHIO

Stress on Ground Steel Surfaces

J. Frisch and E. G. Thomsen of the University of California report in an ASME paper grinding tests that prove heavy cuts with a grinding wheel cause less surface stress and cracking than light cuts.

The test material was SAE 1020. Cuts ranging in depth from 0.0003 to 0.003 in. were taken with a medium-soft wheel on a surface grinder. Stresses above the maximum yield point of the metal were shown up by etching the surface with weak nitric acid to remove a layer of stressed metal. This resulted in a change in deflection of the sample, and measurement of this deflection and measurements of the thickness of metal etched away provided the basis for stress determination.

Although higher stresses are the result of a light grinding cut, stresses are deeper if the cut is heavier. The layer of surface metal subject to stress is thicker than the layer of metal removed with the cut.

As an example, two tests were made; one cutting 0.0003 in. deep, and the other cutting 0.0029 in. deep. The deeper cut produced stresses at the surface up to 50,000 psi, and stress was produced as deep as 0.018 in. below the surface. The shallow cut produced a surface stress of 75,000 psi, but stress disappeared at a depth of 0.012 in. below the surface.

"Here's twenty cents. Treat yourself to some checkers—and put those gage blocks back where they belong!"

subcontracting NEWS

"This defense job is a selective one. It does not go across the board," a high Defense Department official said recently.

He was referring to the fact that the current defense program is not an all-out effort calling for full mobilization. It will require only a limited number of prime contractors. On the other hand, subcontracting (and even sub-subcontracting) will be spread widely.

For that reason, we are beginning in this issue a new department, Subcontracting News. It will contain pertinent information for all metalworking companies desiring or having defense work. It will concern itself with news of prime contract awards and what opportunities these contracts offer to subcontractors. It also will give changes in locations of government agencies which directly or indirectly affect defense business; defense-plant expansion plans; and changes in government regulations pertaining to defense production.

This new department will be published every issue as long as the need for it exists.

Burnham Finney
EDITOR

22 Manufacturers Will Display Aircraft Parts for Subcontracting

NEW YORK — Aircraft components for which subcontractors are sought will be displayed by 22 Air Force prime contractors at offices of the New York Air Force procurement district here Feb. 19-23.

The procurement office's Industrial Planning Section is turning over approximately 18,000 sq ft of floor space on the 12th floor at 67 Broad St. to these 22 manufacturers for display of sample parts, drawings and specifications.

Prime contractors to be represented: Akeley Camera & Instrument Co., New York; Bendix Radio Div., Bendix Aviation Corp., Towson, Md.; Cameraflex Co., New York; Curtiss-Wright Propeller Div., Caldwell, N. J.; Eastern Rotocraft Co., Hatboro, Pa.; Fairchild Camera & Instrument Co., Jamaica, N. Y.; Farrand Optical Co., The Bronx, N.Y.; Kearfott Co., New York; Lavoie Laboratories, Morganville, N. J.; Lite Mfg. Co., New York; W. L. Maxson Corp., New York; Philco Corp., Philadelphia; Piasecki Helicopter Corp., Morton, Pa.; Radio Corp. of America, Camden, N. J.; Reeves Instrument Co., New York; Sikorski Aircraft Corp., Bridgeport, Conn.; Sorenson & Co., Stamford Conn.; Specialty Assembly & Packing Co., Brooklyn, N. Y. Lycoming-Spencer Div., AVCO Mfg. Corp., Williamsport, Pa.; Weston Electric Co., Newark, N. J., and Wright-Aeronautical Corp., Wood-Ridge, N. J.

Eastern Subcontractors Favored

NEW YORK — Republic Aviation Corp., Farmingdale, L. I., has awarded a $2.5-million subcontract to Florence Stove Co., Gardner, Mass., for manufacture of ailerons and wing flaps for the F-84 Thunderjet. Republic's policy is to favor eastern subcontractors to ease the communication problem and to cut shipping costs. But a manufacturer outside this area may be used if he is doing the same type of work for another prime contractor. Republic's backlog at end of year was $270 million in contracts for aircraft. Manager of subcontracting is Lowell Pike. His office is at the Republic plant in Farmingdale.

Close-Tolerance Experience Sought for J&H Contracts

CLEVELAND—Jack & Heintz Precision Industries here will subcontract part of its DO contracts for subassemblies, using a limited number of manufacturers within a 300 mile radius of Cleveland. Prime requisites to obtain J&H work is full complement of machine tools and experience in working to extremely close tolerances. About 20% of dollar value of prime contracts will be involved. In charge of subcontracting program: John Seltzer, director of purchases.

K-F to Subcontract Engine Parts

DETROIT—Subcontracts for components—mostly machine parts—will be let by Kaiser-Frazer Corp., for its recently announced order to build Wright R1300 aircraft engines. In charge of subcontracting: T. A. Bedford, general manager, Detroit Engine Div., Kaiser-Frazer Corp., 12801 E. Jefferson St., Detroit.

GMC Gets $11.5 Million Order

PONTIAC, Mich.—For the $11.5-million motor coach contract obtained by GMC Truck & Coach Div., in general the same suppliers and subcontractors as traditionally used will be asked to work on the order, which will run parallel with former production for civilian market. In charge of program: Harold Havermale, director of military truck program, GMC Truck & Coach Div., 660 South Blvd., Pontiac.

K-F To Use Fairchild Suppliers

WILLOW RUN, Mich. — Kaiser-Frazer Corp. will use mostly previous Fairchild suppliers for subcontracts on subassemblies and components for its recently obtained contract to build the Fairchild "Packet" cargo plane. In determining subcontractors, major criterion is whether Fairchild has already tooled them up. In charge of program: O. E. Johnson, Willow Run plant, Kaiser-Frazer Corp., Willow Run, Mich.

FAST SOLUTION

to your subcontract problems:

Advertise in this

every-issue SUBCONTRACTING NEWS section of American Machinist

Need subcontractors who can give you efficient low-cost help in meeting production schedules on government contracts?

Looking for subcontract work . . . to keep your plant busy and producing in these emergency times?

Advertising in this new, timely, and much-needed section of *American Machinist* is a fast, low-cost way to get in touch with the right people in the right companies.

Here, in every issue, *American Machinist* editors will be reporting all the latest news, from Washington and elsewhere, which is important to both prime contractors and subcontractors on government business.

Important new contracts released by the government will be reported every issue: who got them, what they are for, how much they represent in dollars and units. Latest facts, also, on who buys what for defense needs . . . the right people to contact . . . new and important personnel changes in companies which have big government jobs to do.

Obviously, this news is of great interest to every metalworking executive . . . and your advertising in this SUBCONTRACTING NEWS Section will get top readership, under ideal conditions, from metalworking executives everywhere.

If you need efficient, experienced subcontractors . . . you'll find them among *American Machinist's* management-concentrated, production-minded subscribers.

If you want important subcontract work . . . you can make contact in *American Machinist* with the top executives in every metalworking plant that has important contracts.

Advertising space . . . from full pages down to 1/9th page unit . . . is available, in limited quantity, in this SUBCONTRACTING NEWS Section. Regular advertising rates apply. Full information can be obtained from the *American Machinist* representative in any McGraw-Hill office, or by writing direct to New York. (You'll find a list of all *American Machinist* representatives and McGraw-Hill District Offices on page one of this issue).

ACT NOW. Tell the people you want to do business with what you need, or what you can do, by advertising in these timely, sure-to-be-read pages of SUBCONTRACTING NEWS.

The McGraw-Hill Magazine of Metalworking Production

McGraw-Hill Building, New York 18

American Machinist (ABP) (ABC)

Latest Defense Awards—Many Jobs Will Require Subcontracting Help

AMERICAN MACHINIST continues here its list of major defense awards in Metalworking announced by the Department of Commerce for the Army, Navy and Air Force. Manufacturers interested in working on the larger of these contracts should make their facilities known to the prime contractors named.

Army Ordnance Awards

ACF Brill Motors Co., Philadelphia, buses, $13,760,838.

AC Spark Plug Div., General Motors Corp., Flint, Mich., housings, cores, etc., $128,802; cleaners, covers, etc., $143,547.

Active Gear Co., Chicago, gears, $242,900; countershafts, $82,250.

Allis-Chalmers Mfg. Co., Milwaukeee, lines, pumps, rings, etc., $204,688; met, strip, stud, $467,661; cap track, $748,498; repair kits, $95,506; vehicles, spare parts, shaft pins, gaskets, etc., $180,770; strip, studs, $467,661; lines, pumps, rings, $204,668.

American Auto Parts Co., Inc., Kansas City, Mo., transmissions, $119,436.

Amgears Inc., Chicago, machine tools, $328,000.

Austin Metal Products Co., Detroit, windshield, assembly, $173,000.

Auto Lite Battery Corp., Niagara Falls, N. Y., facilities to manufacture batteries, $740,500.

Bendix Aviation Corp., Detroit, carburetors, screws, kits, $140,530; boxes, covers, fans, $302,296.

Biederman Motor Corp., Cincinnati, engines, $914,250.

Brad-Foote Gear Works, Cicero, Ill., drive, final, $250,000.

Brunswick Ordnance Corp., New Brunswick, N. J., facilities for manufacturing carrier assemblies, $253,200.

Bohn Aluminum & Brass Co., Detroit, bearings, $353,025.

Blaw-Knox Co., Union Cast Steel Div., Pittsburgh, cast steel armor, $1,300,000.

Boyertown Auto Body Works, Boyertown, Pa., ambulance bodies, $538,686.

Cadillac Motor Car Co., General Motors Corp., Detroit, light tanks, $25,000,000.

Chevrolet Motor Div., General Motors Corp. Detroit, trucks, pickup, $1,723,700; trucks, $573,062; automobiles, $251,448.

Chrysler Corp., Detroit, tanks (facilities for building) $230,000,000; axles, $193,200; brake pedals, assembly, $96,090; nut-pad-kit, $184,239; retainer shaft, screws, etc., $555,221; rods, bushings, cylinders, $435,500; protectors & kits, $243,080; facilities for production, $30,000,000.

Continental Motors Corp., Muskegon, Mich., engines and spare parts, $17,374,896; pumps, $306,862.

Cuno Engineering Co., Meriden, Conn., engine filters, $170,940.

Electric Auto-Lite Co., Toledo, Ohio, shields, relay solenoid, $152,166; distributors & couplings, $110,045; kits, regulators, $223,015; facilities for manufacture of electric vehicles, $4,994,485.

(Continued on next page.)

...WANT AIRCRAFT SUBCONTRACTS?

Here's the West Coast picture . . .

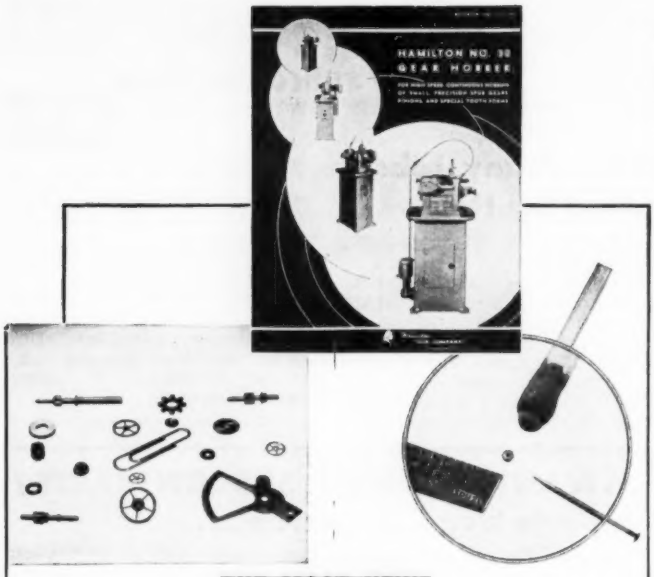
LOS ANGELES—All major aircraft companies in this area are subcontracting, but their approaches are somewhat different. While all plants have contracts in the east and scattered across the nation, most prefer smaller suppliers around Los Angeles whenever possible. Here's the subcontracting picture plant by plant:

LOCKHEED—Has some 3000 subcontractors scattered from California to Texas supplying parts or producing some phase of aircraft. Only about 300 of these are working on actual aircraft assemblies. Lockheed began last year a system of subcontracting also for major sections and subassemblies. Approximately 35-40% of manufacturing manhours at Lockheed are being subcontracted to seven experienced airframe manufacturers. **Potential subcontractors should contact Herbert Caldwell, manager of outside manufacturing, Lockheed Aircraft, Burbank, Calif.**

NORTH AMERICAN—Reports that about 22% of its Air Force orders, and about same percentage of Navy orders, are subcontracted, mostly for sub-assemblies. North American does not discriminate against small suppliers but admits that small shops would have difficulty if they can't handle the complete order. Standards for subcontractors: (1) Financial standing; (2) record of similar work showing capacity to deliver, with nature and complexity of work done on precision aircraft components; (3) must have machinery, skilled labor, and experience to handle order—with proof. **Contact: H. R. Raynor, director of materiel, North American Aviation, International Airport, Los Angeles.**

DOUGLAS—Has 1800 suppliers for three West Coast plants. Subcontracts mostly smaller assemblies, parts, sub-assemblies. Those seeking Douglas jobs must request subcontracting information sheet, asking you to (1) state production floor area; (2) list all machinery; 3) number and skill of employees; (4) show capacity to take orders and deliver on schedule; (5) proof of similar work comparable to aircraft you're now doing commercially. Douglas will not give contracts to plants which must expand to take on a job. **Contact: Don Bosio, director of materiel, Douglas Aircraft Co., Inc., Santa Monica, Calif.**

NORTHROP—Reports that 30% of manhours on its Scorpion F-89 are being subcontracted. Of 3000 active suppliers in all phases of aircraft production, including administrative, Northrop's suppliers break down to: 2175 in the immediate Los Angeles area; 175 machine and sheet metal shops doing specialized aircraft work; 350 southern California vendors who make specialized items to order for military aircraft only. **Contacts: New subcontractors should direct inquiries to Facilities Survey Group, Northrop Aircraft, Inc., Hawthorne, Calif. Previous suppliers should contact D. L. Miller, purchasing agent, Northrop Aviation Corp., Hawthorne, Calif.**



THE MOST NEWS
and
THE BEST NEWS

ABOUT SMALL, PRECISION SPUR GEAR HOBBING

IS YOURS
FOR A MINUTE AND A PENNY

Does your job involve small, precision spur gears? Would you like to produce them fast?

Whether your work calls for long production runs or frequent set-ups, you need to know about the Hamilton No. 00 Precision Spur Gear Hobber. Spend a minute now to send your request for a copy of our Bulletin No. H-00-49. Acquaint yourself with this efficient tool, and be ready for the challenge ahead.

NOTE: If you are interested in helical gears, worm gears, bevel gears, and crown gears, as well as spur gears, ask for Bulletin H 1-49. No obligation.

THE Hamilton TOOL COMPANY
830 SO. NINTH STREET • HAMILTON • OHIO • U • S • A

Ordnance Awards . . . continued

Federal Motor Truck Co., Detroit, axles, bushings, covers, washers, $475,665; kits, $218,699; gaskets, levers, shims, $193,949; flanges and manifolds, $94,300; hubs, front wheel, $162,690.

Federal Cartridge Corp. Minneapolis, cartridges, ignition, $256,613.

Fruehauf Trailer Co., Detroit, trailers, trucks, $34,786,484.

Federal Mogul Service, Coldwater, Mich., bearing sets, $121,854.

Gar Wood Industries, Inc., Wayne, Mich., wrench assembly, $101,292.

Gear Grinding Machine Co., Detroit, shafts, $280,710.

Gentz Tool & Engineering Co., East Detroit, Mich., inserts, $119,017.

P. L. Grissom & Sons, Detroit, rods, seal outlet, screw, $119,048.

GMC Truck & Coach Div., General Motors, Pontiac, Mich., shaft, housing, $122,312; clutch plates, $197,500; balancer, cover, etc., $120,835; kits, steering, gear lever, $99,888; frames, compartment, $114,368; bolts, kit repair, $277,212; filters, pipes, bond, $135,830.

Homelite Corp., Port Chester, N. Y., generators, $183,460.

International Spare Parts Corp., Long Island City, N. Y., engines, $938,236; governors, housing, $398,869.

International Harvester Co., Detroit, transmission covers, $121,339; engines, $803,669; trucks, $1,010,710.

Long Mfg. Div., Borg-Warner Corp., Detroit, facing, $165,000.

Link Belt Co., Indianapolis, roller bearings, $283,283.

Linn Coach & Truck Corp., Oneonta, N. Y., trailers, $1,167,684.

Lipe-Rollway Corp., Syracuse, N. Y., bracket, spring, etc., $552,790.

Machine Tool & Die Co., Detroit, cones, $305,228.

Mackenzie Awning Co., Detroit, enclosures, $255,640.

Mack Mfg. Corp., Plainfield, N. J., kit repair, $243,000.

McQuay-Norris Mfg. Co., St. Louis, Mo., kit, piston, $569,948.

Metro Engineering & Mfg. Co., Detroit, kit, base assembly, $433,000.

Miller Trailer, Inc., Brandenton, Fla., 26-ft. trailers, stake, $197,091.

Maremont Auto. Products, Inc., Chicago, muffler assembly, $110,880.

Mott Haven Truck Parts, Inc., Bronx, N. Y., axles, front, assembly, $145,200.

National Machine & Products, Jackson, Mich., nuts, $109,980.

Neff Equipment Co., Toledo, Ohio, ammeters, $104,130.

Neilson Muffler Corp., Stoughton, Wis., mufflers, $497,867.

New Process Gear Co., Syracuse, N. Y., gears, $164,500.

Oakland Truck Sales, Inc., River Rouge, Mich., engines, with accessories, $135,000; axles, front assembly, $90,000.

Oilgear Co., Milwaukee, Wis., pump handles, brackets, $306,710; motors, $138,692.

Perfection Stove Co., Cleveland, kits, $330,098.

Russell, Burdsall & Ward, Port Chester, N. Y., carriage bolts, $97,640.

Purolator Products, Inc., Rahway, N. J., filters, $169,400.

Pratt & Letchworth Co., Buffalo, N. Y., louvre, ventilating, cast, $321,572.

State Bolt & Screw Co., New York, washers, $105,246.

Sav-Way Sara Seal, Detroit, bushings, $127,628.

Scintilla Magneto Div., Bendix Aviation Corp., Sidney, N. Y., light control switches, $200,000; electrical connectors, $450,400.

Simmonds Aerocessories, Inc., Tarrytown, N. Y., misc. items, $106,737.

Timken Roller Bearing Co., Canton, Ohio, cups, $213,439; bearings, cone, $184,334.

Tobe Deutschmann Corp., Norwood, Mass., misc. filters, $633,000.

Transportation Const. Corp., Seattle, hooks, $103,875.

Triplex Corp. of America, Pueblo, Colo., pistons, $479,706.

Tulsa Winch Co. Div., Vickers, Inc., Tulsa, Okla., collars, covers, etc. $144,207.

United Motor Service Div., General Motors Corp., Detroit, repair kits, $159,368; motor starters, $113,033; generators, $328,856; bearings, valves, $757,881; distributors, generators, $250,833; gearings, race, $757,881; bearings, $164,393.

United Wire Supply Corp., Cranston, R. I., tubing $140,771.

Valentine Welder & Mfg. Co., Detroit, welders, $151,838.

Wagner Electric Corp., St. Louis, Mo., repair kits, $315,150.

Ward LaFrance Truck Corp., Elmira, N. Y., engines, $659,025; covers, shaft, disc., $137,013.

Waterbury Companies, Inc., Waterbury, Conn., cores, $94,000.

Westinghouse Electric Corp., Detroit, lamps, $326,160.

White Motor Co., Cleveland, bracket, guard, $7,085,084.

Williams Bros. Boiler & Mfg. Co., Minneapolis, tooling, bulldozer mount, $861,262.

Willys-Overland Motors, Inc., Toledo, trucks, set, $1,076,862; shafts, gears, etc., $165,389; rings, $163,610; spacer, lever, trans., $207,855; axles, gears, bearing, $703,566.

Army Signal Corp Awards

Burgess Battery Co., Freeport, Ill., batteries, $165,741.

DeJur Amsco Corp., Long Island City, N. Y., Phase III industrial preparedness study for electrical instruments, $109,834.

General Dry Batteries, Inc., Cleveland, batteries, $408,800.

Jacobson Mfg. Co., Racine, Wis., engine generators, $435,345.

National Carbon Div., Union Carbide & Carbon Corp., New York, batteries, $577,367.

Navy Aviation Awards

General Electric Co., Schenectady, N. Y., generators, $923,596.

Glenn L. Martin Co., Baltimore, parts for aviation armament used on P2V and P4M aircraft, $90,835.

Globe Aircraft Corp., Joliet, Ill., maintenance parts for use on Globe pulse jet model for aircraft, $163,234.

Gould-National Batteries, Inc., St. Paul, Minn., storage batteries, $250,000.

Lyons Storage Battery Co., Hamburg, Pa., storage batteries, $113,428.

Schuttig & Co., Inc., Washington, D. C., services and materials to repair ARC-1 components, $224,000.

Solar Corp., Milwaukee, storage batteries, portable, $260,029.

Stratos Div., Fairchild Engine & Airplane Corp., Farmingdale, L. I., N. Y., cooling units, cabin pressurization for aircraft, $162,450.

Western Gear Works, Lynwood, Calif., actuators, for use on P2V4-5 aircraft, $118,848.

Willard Storage Battery Co., Cleveland, storage batteries, portable, $189,834.

Bureau of Ships Awards

Insinger Machine Co., Philadelphia, dishwashing machines, $288,612.

Measurements Corp., Boonton, N. J., signal generators, $412,687.

Motorola, Inc., Chicago, radar beacons, $493,806.

(*Continued on next page*)

ACCURACY

Efficiency

Economy

These three factors are the key-note of our special tools and machinery. Columbus Die-Tool builds and designs the tool for your particular purpose and will solve the toughest tooling problems effectively and promptly. Do not hesitate to consult us, our experience in this field is most comprehensive.

JIGS • FIXTURES • SPECIAL TOOLS
BUILDING COMPLETE MACHINE TOOLS
UNITS FOR MACHINE TOOLS
PUUNCHES AND DIES

Bureau of Ships Awards (cont.)

Teletype Corp., Chicago, teletype printers, $100,000.

Telephonics Corp., Huntington, L. I., radar sets, $129,210.

Waterman Products Co., Inc., Philadelphia, oscilloscopes, portable, $432,523.

Other Navy Awards

Barber-Greene Co., Aurora, Ill., ditching machines, $126,720.

Unit Crane & Shovel Corp., Milwaukee, crane shovels and equipment, $1,939,900.

Baker Raulang Co., Cleveland, trucks, fork, electric, $193,200.

Consolidated Diesel Electric Corp., Stamford, Conn., generators, diesel driven, portable & spare parts, $135,385.

Plomb Tool Co., Los Angeles, wrench sets, $178,625.

Yale & Towne Mfg. Co., Philadelphia Div., trucks, fork, gas, Yard King '40', $303,600.

Air Force Awards

AC Spark Plug Div., General Motors Corp., Flint, Mich., spark plugs, $4,251,260.

Bendix Products Div., Bendix Aviation Corp., South Bend, Ind., wheel and brake assemblies, $131,349.

Biederman Motors Corp., Cincinnati, maintenance parts for engines, $125,000.

Consolidated-Vultee Corp., San Diego, spare parts for aircraft, $6,500,000.

Division Lead Co., Chicago, lead solder, $192,022.

Fairchild Aircraft Div., Fairchild Engine & Airplane Corp., Hagerstown, Md., kits for parts necessary for revision to landing gear, $123,314; mobile training units, $100,000.

Ford Motor Co., Detroit, facilities for production of engines, $14,700,000.

Gilfillan Bros., Inc., Los Angeles, Azel indicator equipment, $4,529,818.

Kaiser-Frazer Corp., Willow Run, Mich., facilities for production of airplanes, $10,000,000.

Miller Steel Co., Kokomo, Ind., low carbon low alloy steel sheet, $383,899.

Minneapolis-Honeywell Regulator Co., Minneapolis, spare parts for turbo regulator systems, $517,243.

New Idea Div., Avco Mfg. Corp., Coldwater, Ohio, trailer and storage rack, $99,852.

Singer Sewing Machine Co., New York, sewing machines, $191,061.

Super Electric Co., Jersey City, N. J., antenna leading coil, $161,379.

Vinco Corp., Detroit, machinery and equipment, $120,000.

Waltham Screw Co., Waltham, Mass., support, plunger, for delay plunger, M1, $103,745.

Defense Plant Expansion Aided By 5-Year Tax Amortization Provision

WASHINGTON—U.S. industry's expansion for defense production is being helped along with the 5-year tax amortization provision approved last fall. Already, some 1500 companies have applied for this tax benefit on expansion that totals upwards of $5 billion.

One hundred and nine companies have had their applications for certificates approved. These companies have obtained approval to write off all or part of the cost of the plant they build at the rate of 20% of the cost per year for five years.

These companies are not committed to the expansion. For any number of reasons, they may not go ahead. Tax amortization benefits are not necessarily for 100% of the amount indicated. Jones & Laughlin, for instance, got amortization benefits on about 55% of an expansion program amounting to $144 million. On the other hand, companies expanding to produce a strictly military item may get 100% amortization—but maybe not.

Here is a partial listing of the companies. Dollar ammount applied for is indicated, with the products named for which plant expansion is sought.

Allied Controls Co., relays and coils, $56,149 at Plantsville, N. Y., and $35,430 at New York.

Chicago & Eastern Illinois RR Co., box cars, $3,500,000; gondola cars, $640,000.

Aeroquip Corp., Jackson, Mich., flexible hose lines, $376,367.

Lehigh Valley RR, box, hopper and flat cars, $8,535,490.

S. K. Wellman Co., Bedford and Cleveland, Ohio, clutch and brake parts, $3,678,770.

Houdaille-Hershey Corp., N. Chicago, Ill., tank parts, $640,000.

Sylvania Electric Products, Inc., Boston, electrical appliances, $1,075,000.

Grumman Aircraft Engineering Corp., Bethpage, N. Y., airplane parts, $88,825.

Chesapeake & Ohio RR Co., freight cars, $31,587,000.

Kaiser Steel Corp., Fontana, Calif., steel ingots—tin plate, $24,595,000.

Minneapolis-Honeywell Regulator Co., Micro Switch Div., Freeport, Ill., electric appliances (precision switches), $650,000; at Minneapolis, aircraft controls, $2,316,618 and $3,788,000.

Mechanical Products, Inc., Jackson, Mich., electrical appliances, $159,857.

Austenal Laboratories, Inc., Rockaway, N. J., aircraft parts, $292,850.

Star Tool & Die Works, Detroit, aircraft fixtures, $266,000.

Raybestos-Manhattan, Inc., Stratford, Conn., clutch, plates, $359,007.

Brooks & Perkins, Inc., Detroit, magnesium alloy, sheets & plate, $573,500.

Warren Webster & Co., Camden, N. J., booster metal parts (ordnance) $250,000.

Cook Electric Co., Chicago, aircraft parts, $276,094.

Aircraft Fitting Co., Cleveland, aircraft parts, $124,506.

Gould-National Batteries, Inc., Chicago or Detroit, ordnance and aircraft batteries, $1,056,500.

Raytheon Mfg. Co., electronic equipment, $2,007,720 at Waltham, Mass., and $800,000 at Quincy, Mass.

M. W. Kellogg Co., Jersey City, N. J., engines, $154,084.

Massey-Harris Co., Racine, Wis., carriage, howitzer, $1,806,196.

Apex Tool Co., Bridgeport, Conn., aircraft engines, parts and accessories, $139,754.

M. B. Mfg. Co., Inc., New Haven Conn., aircraft engine mounts and fittings, $108,240.

Deutsch Co., Los Angeles, hydraulic fittings, $54,334; aircraft parts, $354,179.

Howard Foundry Co., Chicago, aircraft parts, $1,222,175.

Oceanside Machine Shop, machining steel parts for airplanes, $31,035 at Plymouth, N. H., and $12,584 at Oceanside, N. Y.

Whitney Blake Co., Hamden, New Haven, Conn., field wire, $451,951.

J. P. Seeburg Corp., Chicago, radio apparatus, $127,230.

Miller Printing Machinery Co., Pittsburgh, gun mounts, $125,000.

Republic Aviation Corp., East Farmingdale, Long Island, N. Y., aircraft, $5,348,047.

Detroit Kellering Co., machining of engine mounts, $103,970.

Machlett Laboratories, Inc., Springdale, Conn., electric equipment, $555,000.

The Wel-Met Co., Kent, Ohio, bearings, $412,534.

McDonnell Aircraft Corp., Lambert, St. Louis, and municipal airport, Robertson, Miss., aircraft parts, $11,115,922.

Cablair Products Co., Culver City, Calif., airframe parts, $64,935.

Tung-Sol Lamp Works, Inc., Bloomfield, N. J., electron tube, $60,600.

Marcus Mason & Co., Inc., Westboro, Mass., couplings, $83,071.

Boeing Airplane Co., Seattle, aircraft, $343,107.

Sundstrand Machine Tool Corp., Rockford, Ill., aircraft parts, $550,605 and $2,827,175.

Alexson Mfg. Co., Montebello, Calif., aircraft parts, $1,125,000.

Lewyt Corp., Long Island, N. Y., communications equipment; $3,194,783.

Jackson-Hope Towing Co., Inc., Mobile, Ala., barges, $94,360.

Radio Receptor Co., Inc., Brooklyn, N. Y., electronic equipment, $490,000.

Ford Has More Than Half the Tools Needed To Build P & W Engines

DETROIT—More than half of the machine tools needed to start production of 28-cylinder Pratt & Whitney aircraft engines for the Air Force are in process of being installed in Ford Motor Company's Aircraft Engine Div. plant in Chicago, John Dykstra, vice president, Aircraft Engine, Tractor & Machined Products Group, reports.

Remainder of machinery either has been ordered or is being rehabilitated from a machine tool pool, as fast as processing of the many different parts and coordinating of changed schedules will permit.

Pratt & Whitney engineers are providing Ford with technical data and assistance in the tooling-up program.

Local contractors are working on plant rehabilitation, necessary to accommodate all installations.

In describing the speed of progress attained at Chicago, Mr. Dykstra noted that contracts were signed in October.

"Planning and engineering work of the Aircraft Engine Division's manufacturing staff has progressed according to schedule so far . . . Barring setbacks such as strikes . . . we feel engine production will commence as planned."

Latest NPA Orders . . .

M-8 (amended) — Tin. Pig tin, secondary tin and certain tin-bearing products may be used only for specified purposes in manufacturing, processing and construction, effective March 1. Uses not specifically set forth in the order are prohibited. The previous provision, reducing users of tin during February and March to 80% of their average use of both primary and secondary tin during the first six months of 1950, has been removed for secondary tin, but retained for pig tin.

M-14 (amended) — Nickel. Further conserves nickel by permitting its use only in highly essential items. Nickel silver or nickel plate may not be used beginning March 1, and nickel bearing stainless steel or high-content nickel alloys may not be used beginning April 1, in such typical items as: clad bumpers, grills, hub caps, decorative trim, doors, down spouts, roofing, ash trays, cabinets, drainboards, flat ware, table and range tops, automatic vending machines, jewelry, sporting goods, toys, piping, valves and fittings, bar and cafeteria counters, water coolers, casket hardware, food mixers, hand tools, and many others. A two-month period has been provided to permit completion of articles started before the effective dates.

M-22 (amended) — Distribution of aluminum scrap. Postpones effective date of certain provisions until March 1 in order to permit inclusion of additional firms as processors of aluminum scrap. Pending further review of firms qualified to process scrap, there is no limitation on concerns presently processing scrap. Foundries, certain types of chemical firms and others are now allowed to obtain special kinds of scrap for use in the regular course of their operations.

Follow this section each issue for news about

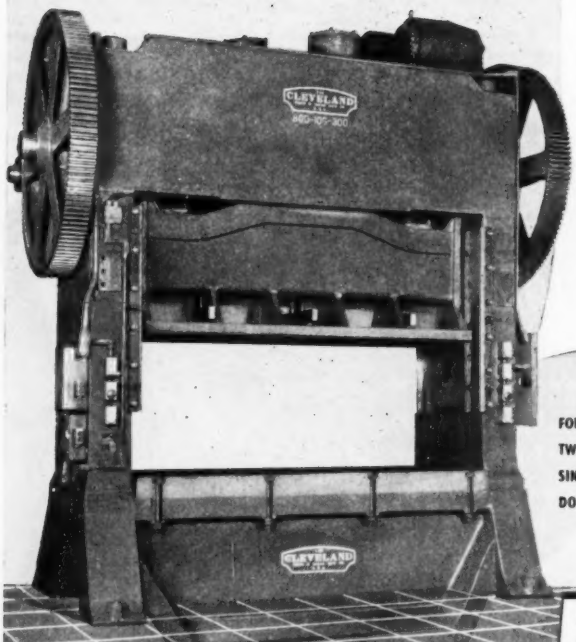
. . . defense contract awards

. . . plans of prime contractors

. . . plant expansion for defense

All the news to help you in subcontracting problems.

More Stampings at lower cost with the right CLEVELAND



Every Cleveland Press is designed and constructed to give top production at the lowest possible operating cost. Therefore you can expect uninterrupted high speed production because rugged construction minimizes vibration and deflection under load. The outstanding (patented) Cleveland Drum Type Clutch virtually eliminates clutch maintenance.

For peak efficiency select the right Cleveland for your particular requirements. Cleveland offers a wide selection of eleven types of power presses. Each is furnished in a wide range of sizes and capacities. Take advantage of our engineering service; our recommendations will not be restricted by limitations of type or size. Contact us today, for this free advisory service. A-3011

FOUR POINT		TRIMMING
TWO POINT	S.S. DOUBLE CRANK	S.S. SINGLE CRANK
SINGLE POINT	OPEN BACK GAP	HORNING
DOUBLE ACTION TOGGLE	KNUCKLE JOINT	INCLINABLE

Cleveland Straight-Sided Double Crank Press, double-geared, equipped with air friction clutch and 2 station electrical control.

Stroke of Slide	16"
Adjustment of Slide	6"
Shut Height	30"
Base of Slide	44" x 102"
Bed Area	50" x 108"
Strokes per minute	12
Capacity	300 tons

THE CLEVELAND PUNCH & SHEAR WORKS CO.
U. S. A.
Established 1880

PUNCHING TOOLS & DIES

OFFICES AT:
NEW YORK . . . . CHICAGO
DETROIT . . . . PHILADELPHIA
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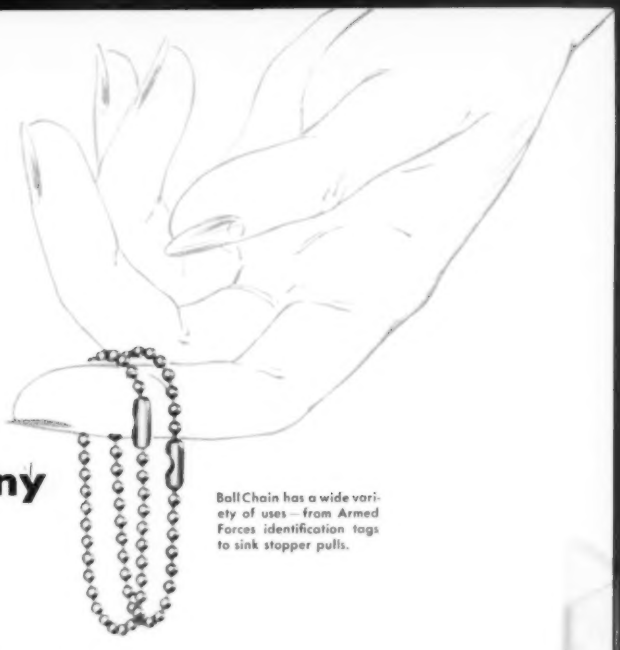
POWER PRESSES

FABRICATING TOOLS

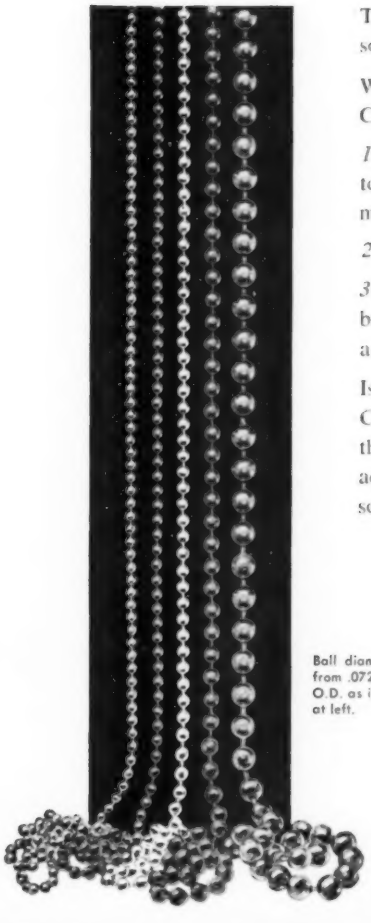
CLEVELAND 14, OHIO

FOR SALE

. . . two for a penny



Ball Chain has a wide variety of uses — from Armed Forces identification tags to sink stopper pulls.



Ball diameters vary from .072" to .187" O.D. as illustrated at left.

That, roughly, is the manufacturer's price in quantity for these solid brass key chains.

What makes it possible? These three factors, as outlined by the Ball Chain Manufacturing Co., Inc., of Mount Vernon, New York:

1. Ingenuity in the design of multiple dies of extremely close tolerances . . . and their adaptation to specially developed automatic equipment.

2. High production over long periods.

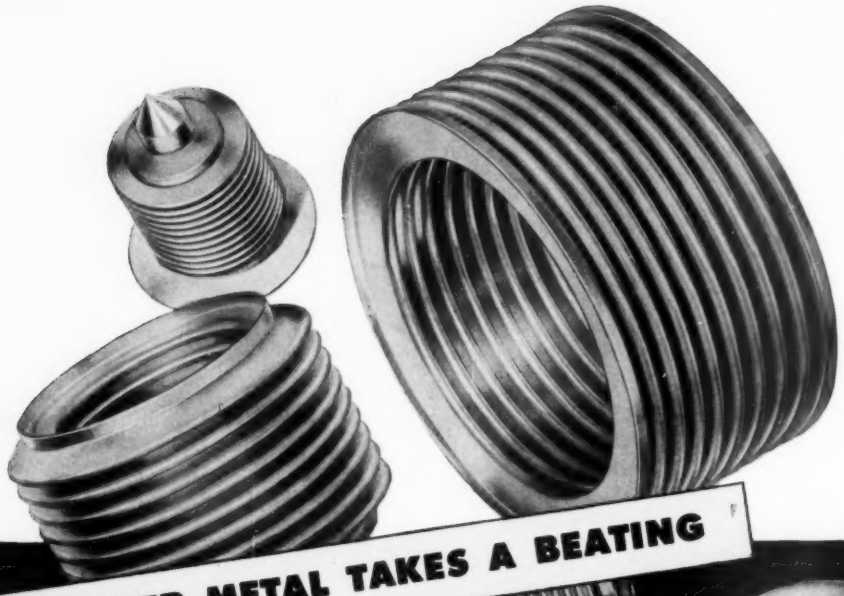
3. Uncompromising standards of quality in every mill shipment of brass, copper or nickel silver strip necessary for the fabrication of a wide variety of Ball Chains and attachments.

Isn't it significant that "Ball Chain" considers The American Brass Company its most dependable source of supply for metals made to the most exacting requirements: composition, anneal, flatness across the entire strip width, and uniform gage of metal which, in some instances, must be within .00025".

ANACONDA

the name to remember in

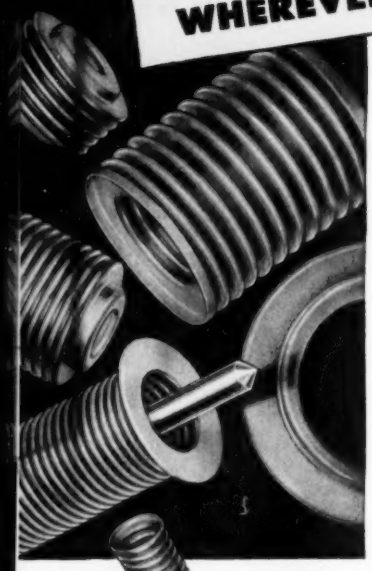
COPPER • BRASS • BRONZE

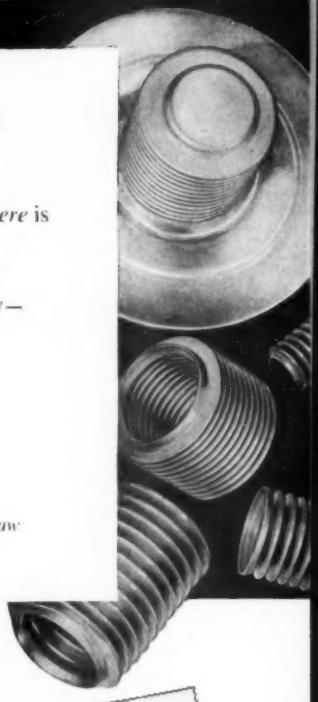


WHEREVER METAL TAKES A BEATING

. . . in manufacturing, in service, or both—
no other alloys possess the combination of
properties of Phosphor Bronze. And *nowhere* is
finer Phosphor Bronze produced than in
the mills of The American Brass Company—
in sheet, wire, rod and tube.

Illustrated here are a few of the myriad of bellows and bellows devices made of Anaconda Phosphor Bronze and other Copper Alloys by The Bridgeport Thermostat Division of Robertshaw Fulton Controls Co., Bridgeport, Conn.





ANACONDA

PHOSPHOR BRONZE HIGH

Tensile strength
Elastic limit
Resistance to fatigue
Resistance to corrosion
Resistance to wear

TROUBLED BY CLOSE TOLERANCES IN HOLE PRODUCTION?

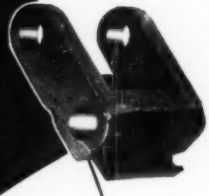
You Can Stay Within Limits and Get Speed, too, With

SUNNEN HONING

Quickly removes heat treat distortion.

Vacuum pump body
Material = Malleable cast iron
Hole diameter = 1⅜"
Length = 1.0"
Interruptions = ¼" keyway
Tolerance = ± .0001"
Finish = 3 micro-inches
Stock removal = .002"
Production = 25 per hour (including gaging)

Holds true accuracy throughout length of part



Perfect alignment speeds assembly, improves operation.

Sunnen honing machines hone metals, ceramics, glass—are used for everything from de-burring to micro-fitting. Dimensional accuracy is guaranteed to .0001", and in some cases is being held as close as 25 millionths. Bores are geometrically true, free from bell-mouth and taper. Surface finish to 2 micro-inches RMS can be produced in hardened steel. Diameter range is ⅛" to 5½".

A complete installation costs less than $1,000—usually pays for itself in a few months' time. Investigate Sunnen Honing for *your* plant; it may be just what you need for hole sizing and finishing. Mail the coupon for details.

Sunnen Honing produces accurate holes—reclaims expensive rejects from other operations—frequently solves I.D. sizing and finishing problems *when nothing else will.* Latest model machines have many improvements that cut honing time and reduce gaging time. Jigs, fixtures, and set-up time are practically eliminated. Even relatively unskilled help can hone parts at rates up to 400 per hour, *with controlled duplication of size.*

SUNNEN PRODUCTS COMPANY
7920 Manchester Ave., St. Louis 17, Missouri
Canadian Factory: Chatham, Ontario

SUNNEN HONING

SUNNEN PRODUCTS COMPANY
7920 Manchester Ave., St. Louis 17, Mo.

☐ Please send complete information on Sunnen Honing. ☐ Have a honing engineer call.

Name.....

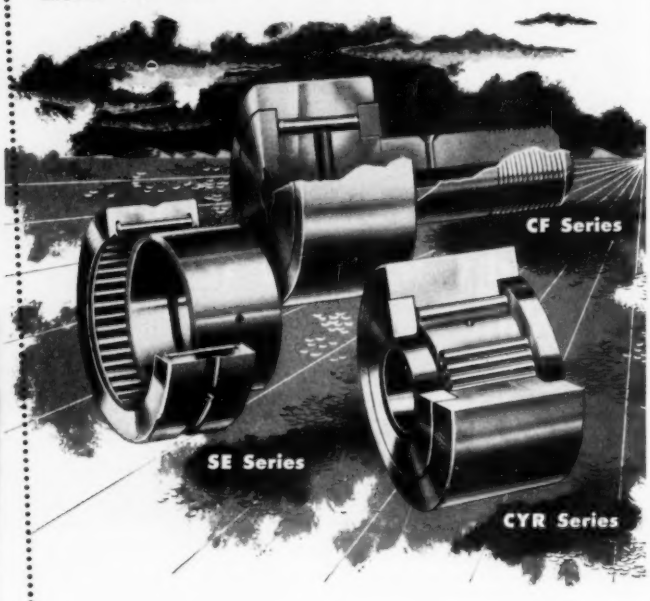
Company.....

Address.....

City..... State.....

"longer life and greater efficiency"

with McGILL® MULTIROL® Bearings



Compared with friction hampered plain bearings McGILL MULTIROL full type roller bearings resist wear because of their easily lubricated roller line contact with raceways. Longer life and greater efficiency is the natural result of the constant precision maintained in the bearing. Lubrication is simplified and required much less frequently. Maintenance is free of costly down time for periodical adjustments and bearing replacement. MULTIROL bearings are your assurance of adding these advantages to the operation of your machinery. Millions in service to date prove such exclusive features as one piece outer race and roller retaining end shoulders, and lubrication reservoirs above roller ends in the SE Series. CF and CYR Series have thick outer race sections for heavy shock load in cam action applications. Mounting is possible with or without stud.

Write today for Bulletins on all MULTIROL Bearing series.

McGILL MANUFACTURING CO., INC. . . . . BEARING DIVISION
111 N. LAFAYETTE ST. . . . . VALPARAISO, INDIANA

McGILL® precision bearings

NAMES IN THE NEWS

Russell B. Weil has joined Franklin Metals Co., Newark, N. J., to serve as buyer and seller of metals. He was formerly assistant purchasing agent of Nassau Smelting & Refining Co., Tottenville, S. I., N. Y.

Dr. Karl T. Compton, chairman of the Corporation of Massachussetts Institute of Technology, received the 1950 Hoover Medal for "distinugished public service," awarded by American Institute of Electrical Engineers, American Society of Civil Engineers, American Society of Mechanical Engineers, and American Society of Mining & Metallurgical Engineers. The medal was presented at the AIEE winter general meeting in New York, Jan. 22-26.

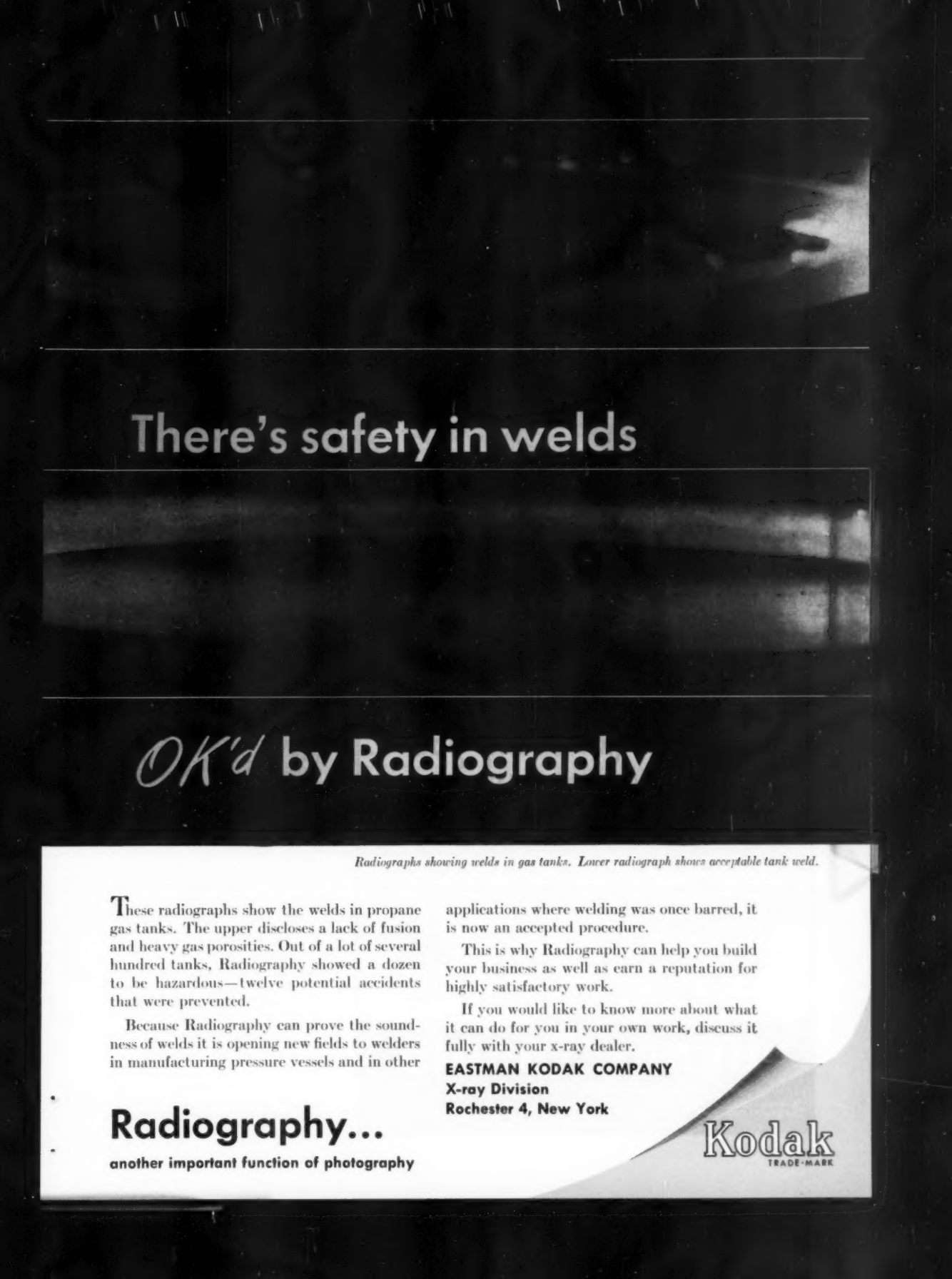
Ray F. Sparrow has been named senior vice president of P. R. Mallory & Co., Inc., Indianapolis. He has been vice president in charge of sales since 1931.

J. M. East has been named vice president and general manager of King & Kringel Machinery Corp., Denver, Colo., dealer for Hyster Co. industrial materials handling equipment. Mr. East was with Independent Pneumatic Tool Co., Aurora, Ill., for eight years.

E. R. Pettengill has been named administrative assistant to the general manager, Pontiac Motor Div. of General Motors Corp., Pontiac, Mich. **Buel E. Starr** was named general manufacturing manager and **A. F. Johnson** was named manufacturing manager. Other appointments: **J. P. Charles,** assistant chief engineer; **Charles O. Johnson,** general plant superintendent; **George Guinn,** axle plant superintendent.

William J. Fleming, formerly vice president in charge of engineering, at Trumbull Electric Mfg. Co., Plainville, Conn., has been named vice president in charge of engineering and manufacturing, General Electric X-Ray Corp., Milwaukee. He has been associated with GE for over 27 years.

J. S. Johnson has been named assistant to the president of United States Rubber Co., succeeding **G. R. McNear,** elected a director and managing director of North British Rubber Co., Ltd., Edinburgh, Scotland, in which U. S. Rubber is a substantial stockholder.



Radiographs showing welds in gas tanks. Lower radiograph shows acceptable tank weld.

These radiographs show the welds in propane gas tanks. The upper discloses a lack of fusion and heavy gas porosities. Out of a lot of several hundred tanks, Radiography showed a dozen to be hazardous—twelve potential accidents that were prevented.

Because Radiography can prove the soundness of welds it is opening new fields to welders in manufacturing pressure vessels and in other applications where welding was once barred, it is now an accepted procedure.

This is why Radiography can help you build your business as well as earn a reputation for highly satisfactory work.

If you would like to know more about what it can do for you in your own work, discuss it fully with your x-ray dealer.

EASTMAN KODAK COMPANY
X-ray Division
Rochester 4, New York

Radiography...

another important function of photography

Kodak
TRADE-MARK

A Reamer for Every Job—

GREATER PRODUCTION AT LOWER COST!

Just one big happy family — to bring you increased production . . . less tool cost . . . greater accuracy . . . better finish. Let the W-S family of Carbide Reamers go to work for you. Choose from a complete range of sizes, wide selection of styles and straight or taper shanks of special heat treated alloy steel. Quick delivery — from your Wendt-Sonis distributor.

Free! *New Reaming Instruction Chart Determines feeds, speeds and stock removal for reaming steel, ferrous, non-ferrous and non-metallic materials. Write today: Wendt-Sonis Company, Hannibal, Missouri.*

WENDT SONIS

CARBIDE CUTTING TOOLS

BORING TOOLS • CENTERS • COUNTERBORES • SPOTFACERS • CUT-OFF TOOLS
DRILLS • END MILLS • FLY CUTTERS • TOOL BITS • MILLING CUTTERS • REAMERS
ROLLER TURNING TOOLS • SPECIAL BITS

W. I. Tebo has been named Washington engineering consultant and technical advisor for Detrex Corp., Detroit.

James J. Filas was named manager of the newly-created Fastener Dept., Acme Steel Co., Chicago. He had been special representative in charge of stitching machine activities in the Central Div.

George N. Mangurian has been named chief of structures, Northrop Aircraft, Inc., Hawthorne, Calif. He formerly was supervisor of structure projects, Glen L. Martin Co. He succeeds **A. M. Schwartz,** named staff assistant to Mr. Northrop. Before joining Martin in 1937, he was assistant chief of structure for Chance Vought Corp.

Bernard Stapp has joined Chicago-Latrobe Div., United Drill & Tool Corp., as district manager to cover the south central territory, comprising the states of Texas, Oklahoma, Arkansas, Louisiana and Mississippi, headquartering in Fort Worth. He succeeds **Victor E. Griffin,** who has been transferred to the Michigan industrial territory, with headquarters in Detroit.

Harold R. Potter has been named sales manager, Cleveland district, Carpenter Steel Co., Reading, Pa. He succeeds **James S. Bailey,** named assistant to the vice president in charge of sales.

Ernest B. Meynard has been named assistant sales manager, Buckeye Tools Corp., Dayton, Ohio. He has been with the firm since 1942.

Norman C. Minehart has been elected vice president in charge of the Abrasive Div., Charles H. Besly & Co., Chicago. **Jack T. LeBeau** was named manager, Abrasive Dept.

F. L. Crossman has been named president, Lindsay Wire Weaving Co., Cleveland, to fill the vacancy caused by death of his father. He has been assistant treasurer.

James Gerity, Jr., president of Gerity-Michigan Corp., Adrian, Mich., has been elected a director of Doehler-Jarvis Corp., New York.

Paul E. Young has been named director of purchases, Timken Roller Bearing Co., Canton, Ohio, succeeding **Dwight A. Bessmer,** recently named assistant to the president. **R. J. Archibald** was named assistant general purchasing agent.

CrysCoat

is in Good Company!

*Prepares Metal Surfaces for Painting

**Patented Material and Process*

THE name ROYAL on a typewriter stands for the finest in equipment construction, performance and appearance. To the Oakite *CrysCoat* Process has been entrusted the task of assuring the durable finish and fine appearance of the Royal Typewriter.

The Oakite *CrysCoat* Process may be just what you're looking for. With minimum equipment . . . in minimum time . . . at minimum cost you can (1) clean metal surfaces and condition them for painting; (2) improve the adhesion of paint to metal; (3) prevent corrosion before metal is painted; (4) localize corrosion under paint if finish is broken.

The Oakite *CrysCoat* Process Offers These Extras:

1. **Eliminates operations . . . uses less equipment**
2. **Cuts operating time**
3. **Uses less chemicals for cleaning and conditioning**
4. **Reduces heating costs**
5. **Saves cost of expensive acid-proof tanks and equipment**
6. **Saves cost of frequent descaling and desludging**
7. **Drag-out costs are less because of low original cost of solution**
8. **Saves paint**
9. **Cuts cost of rejects caused by rusting before painting**

FREE . . . illustrated folder describes the Oakite *CrysCoat* Process for use in before-paint-treatment of steel, aluminum sheet and castings, zinc die castings and galvanized surfaces. If you are engaged in the fabrication of civilian goods or the speedy production of defense orders—send for Folder F7642.

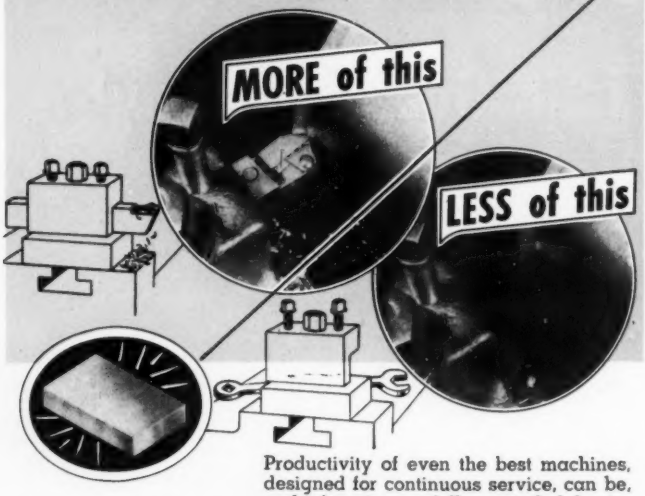
OAKITE PRODUCTS, INC., 24 Thames St., NEW YORK 6, N. Y.
Technical Service Representatives in Principal Cities of U. S. & Canada

SPECIALIZED INDUSTRIAL CLEANING

OAKITE

MATERIALS • METHODS • SERVICE

HOW TO REDUCE "LOST-BUT-PAID-FOR" MACHINE HOURS



Productivity of even the best machines, designed for continuous service, can be, and often is, woefully curtailed by inferior tools that wear rapidly and require frequent shutdown for replacement. Production is thereby recurrently interrupted, *but* costs never cease. Lost time must be paid for.

Kennametal tools, on the contrary, have a remarkably long service life. Outstanding durability is inherent. They work more hours per day, spend less time in the grinding room, and thus help reduce idle machine time, make operators more efficient, reduce tool inventory. Superior performance is attained because the physical structure of Kennametal is sound and uniform — the desired properties of hardness, strength, and toughness are consistent.

These outstanding characteristics are achieved through a unique coordination of manufacture and all-inclusive control from raw materials to finished product — refinement of all carbides directly from ores, oxides, and by-products — processing of these carbides into Kennametal compositions by exclusive methods and patented techniques — fabrication of complete tools and wear-part designs that fully utilize the distinctive properties of Kennametal.

For those who wish assistance in developing the most efficient tool applications Kennametal Inc. maintains a corps of competent Field Engineers in all important industrial centers. Their services are available for helping you to reduce lost-but-paid-for machine hours.

KENNAMETAL *Inc.*, Latrobe, Pa.®

MANUFACTURERS OF SUPERIOR CEMENTED CARBIDES AND CUTTING TOOLS THAT INCREASE PRODUCTIVITY

Edward Salner has been named manager, Precipitator Dept., Metal Products Div., Koppers Co., Inc., Baltimore. He succeeds **Frank H. Linthicum**, who died Dec. 11, 1950.

Charles H. Wagner has been elected a vice president and director of Gerotor May Corp., Baltimore.

Albert J. Berdis has been named general superintendent of United States Steel Co.'s new Fairless works at Morrisville, Pa. He was assistant general superintendent, Irvin works, and before that superintendent of the U.S. Steel plant, Vandergrift, Pa.

Alan F. Dill was named to the newly-created post of defense regulations coordinator, American Steel & Wire Co., Cleveland.

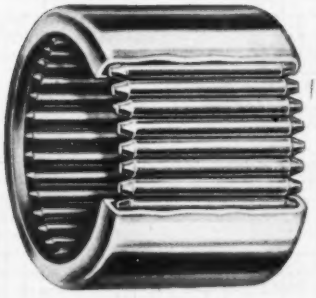
George A. Seaver and **William H. Leland** have been named managers, respectively, of the New York City branch and Newark, N. J., branch, Howe Scale Co., Rutland, Vt.

R. D. Redner has been named sales representative, Detroit Diesel Engine Div., General Motors Corp., covering Minnesota, North and South Dakota, Iowa, Nebraska, western Missouri and Kansas.

Robert L. Gibson

Robert L. Gibson has been named general manager, Chemical Dept., General Electric Co., Pittsfield, Mass. Formerly assistant general manager of the department, he will be responsible in his new capacity to **Harold F. Smiddy**, G-E vice president in charge of the Chemical Dept. In June 1948 Mr. Gibson was named manager of the Plastics Div., and the following October was named assistant general manager of the department. **John T. Castles** has been named manager of the silicone plant at Waterford, N. Y. He had been manufacturing engineer for the plant since April, 1949.

how to "baby" a mammoth



The way to handle a big load smoothly and easily with the smallest possible anti-friction unit is to use a Torrington Needle Bearing. The Needle Bearing has a higher radial capacity than any other anti-friction bearing of comparable size. We will be glad to show you what this can mean in terms of the compactness, capacity, life expectancy and all 'round performance of your equipment.

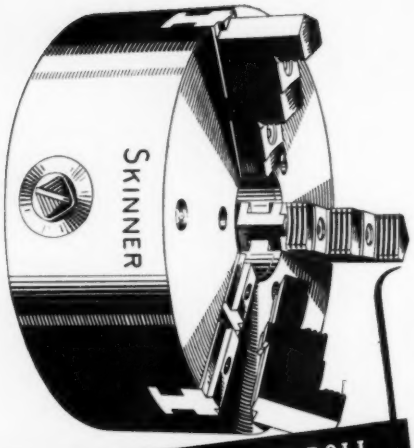
THE TORRINGTON COMPANY

Torrington, Conn. • South Bend 21, Ind.

District Offices and Distributors in Principal Cities of the United States and Canada

TORRINGTON *NEEDLE* BEARINGS

NEEDLE • SPHERICAL ROLLER • TAPERED ROLLER • STRAIGHT ROLLER • BALL • NEEDLE ROLLERS



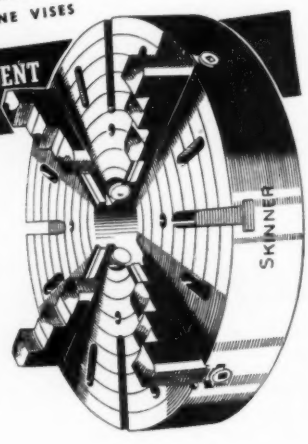
SKINNER SCROLL CHUCKS

Sold by leading distributors in every industrial area

Finest engineering, quality materials and latest production techniques are your assurance that nothing can surpass the quality of Skinner Chucks. Whether you are a builder or user of machine tools, you should be sure that none of the basic accuracy of your machines is lost through "second-best" chucking equipment. The Skinner trade-mark denotes "The Crest of Quality," and your nearby Skinner distributor is ready and willing to show you the quality features inherent in the complete Skinner line. Ask him for the Skinner Catalog, or write direct to the company.

HAND & POWER OPERATED MACHINE CHUCKS — AIR CHUCK EQUIPMENT — FACE PLATE JAWS — MACHINE VISES

SKINNER INDEPENDENT CHUCKS



SKINNER CHUCKS

THE CREST OF QUALITY

THE SKINNER CHUCK CO

343 Church Street, New Britain
Connecticut

C. R. Maxon of New Jersey Zinc Co. was recently presented with the first annual Doehler Award of the American Die Casting Institute for resolving an inconsistency in government purchasing and specifying practices based on an unfamiliarity with industrial standards relating to the impact strength, tensile strength and other mechanical properties of on-grade zinc die castings.

Edmund A. Watson has been named assistant to vice president, American Car & Foundry Co. He will be engaged in manufacturing activities of the Production Dept. **Robert A. Harris** has been named chief improvement engineer of the Production Dept. **Harry J. Leddy** has been elected executive vice president, and **John B. Davenport** has been named vice president in charge of sales, Shippers' Car Line Corp., an ACF subsidiary.

Dr. Edward M. Pritchard has been named chief electrical engineer, Control Engineering Corp., Canton, Mass. He was formerly chief engineer, Fisher-Pierce Co., and chief applications engineer, Sigma Instrument Co.

James E. Barthmaier has been named district manager of diesel engine sales and service for the New England territory of Enterprise Engine & Machinery Co., San Francisco, with his headquarters in Boston. **Hugh H. Goodwin** has been named sales engineer for Enterprise's New York branch. Both men were formerly with Superior Engine Div., National Supply Co., Boston.

Alfred T. Duff has been named superintendent, Tin Mill Div., Gary Sheet & Tin mill, Carnegie-Illinois Steel Corp. He succeeds **Thomas W. Hunter,** named assistant general superintendent, Irvin Works, Dravosburgh, Pa.

Roger H. Brown has been named eastern sales manager, ICB Div., Warner Electric Brake & Clutch Co., Beloit, Wis. He formerly handled engineering sales of the company's industrial clutches and brakes in the New York area. New York sales will be handled now by **R. C. Wiard** and **W. E. Gregg,** with headquarters in Middletown, Conn.

A. D. Sheere has been named manager, San Francisco Div., A. M. Byers Co., Pittsburgh, succeeding **P. D. Tabler,** retired. **N. L. Brown** succeeds Mr. Sheere as manager, Houston Div.

The New

Hoffman

ELECTRONIC SAFETY GUARD

gives you

- INCREASED PRODUCTION
- LOW MAINTENANCE COST
- NO OPERATOR FATIGUE
- NO ACCIDENT TIME-LOSS

New Electronically Controlled SAFETY and BARRIER GATE GUARD brings benefits to both management and workers

YOU can increase your plant power press production immediately with installation of the Hoffman Safety and Barrier Gate Guard. It gives the operator greater assurance, eliminates fatigue and accident time-loss. It gives you higher production per man hour.

The Hoffman Guard is an electronically controlled guard consisting of four major parts—Light Source and Photo Cell Assembly—Amplifier—Magnetic Treadle Control—Non-Repeat Micro Switch. The Barrier Gate Guard is an auxiliary unit and is used as a double safety precaution.

The Light Source and Photo Cell Assembly are positioned between the operator and power press providing a light beam between the operator and "Die Sets." Interruption of this beam renders the press inoperative. When the operator completely removes arms and hands from light beam a depression on the foot treadle motivates Magnetic Treadle Control and the ram operates. One stroke operation is assured by the non-repeat Micro Switch. However, continuous stroke operation is possible with the By-Pass Switch, when desirable. Double protection is provided when Barrier Gate is used. If brake adjustment is incorrect Barrier Gate will fall when operator breaks light beam, completely enclosing "Die Set" area.

Failure of any of the electronic parts of the Guard renders press inoperative.

The Electronically Controlled Guard is designed for No. 5 presses or smaller. Guards for larger presses can be especially designed and engineered.

There is no engineering skill required to install or operate this Electronic Guard, but this Guard should not be purchased unless the buyer is ready and able to service it properly.

HOFFMAN ENGINEERING CORPORATION
ANOKA, MINNESOTA
Electronic Controls for Industry

HOFFMAN ENGINEERING CORPORATION
Department 1-2 • Anoka, Minnesota

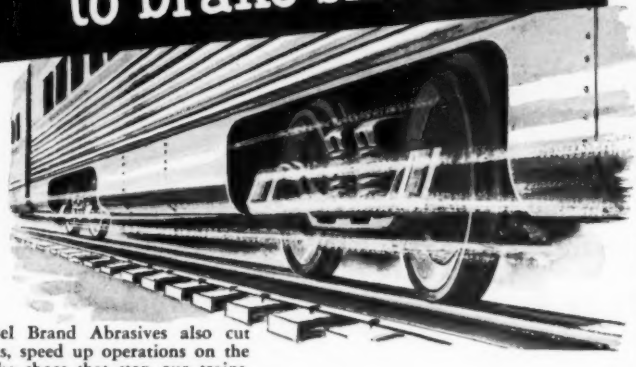
Please send free complete details about the Hoffman Electronic Safety Guard.

Name_____
Firm_____
Address_____
City_____ State_____

From ball bearings

Jewel Brand Coated Abrasives help to keep industry rolling. Fine grit, cloth backed Jewel Brand Aluminum Oxide is used for hand-polishing raceways and sides of ball bearing assemblies, which must be mirror smooth.

to brake shoes



Jewel Brand Abrasives also cut costs, speed up operations on the brake shoes that stop our trains. Fast-cutting, heat-resistant *Weldisks* permit faster grinding, safely! *Weldisks* will not curl or warp . . . are noted for their durability.

THERE'S A JEWEL BRAND COATED ABRASIVE to do every job, large or small, and to do that job *quicker, cleaner,* at *lower cost!* Ask your industrial distributor or write for catalog. Abrasive Products, Inc., 561 Pearl Street, South Braintree 85, Mass.

SHARPER, TOUGHER

Jewel COATED Abrasives

CUT COSTS!

John E. Petersen

John E. Petersen has been named managing director of Link-Belt Africa Ltd., wholly-owned South African subsidiary of Link-Belt Co., Chicago. He was formerly divisional engineer at the company's Pershing Road plant in Chicago. **Gene Zwerner,** heretofore Link-Belt district sales engineer at Detroit, was named sales manager of the African subsidiary. **A. L. Endroll,** district sales engineer at the Atlanta, Ga., plant, will supply additional manufacturing and engineering experience in the African plant. A 12,000-sq ft manufacturing plant, with separate office building has been purchased at Springs, Transvaal, about 28 miles from Johannesburg, for manufacture of conveyor machinery and other Link-Belt products.

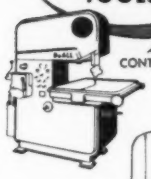
E. A. Erickson has been named manager of the Hornell, N. Y., plant of SKF Industries, Inc., Philadelphia. He had been shop superintendent since 1947. **Harry R. Fillmore** was advanced from general foreman to assistant plant manager. **William F. Hagen** has been named assistant district manager of SKF's New York office.

Richard E. White, formerly a Navy commander in charge of the Bureau of Aeronautics' Power Plant Div., has been named chief administrative engineer, Metal Products Div., Ryan Aeronautical Co., San Diego. Prior to entering the Navy in 1942 he was with Wright Aeronautical Corp. for 14 years, part of the time as vice president and treasurer of Wright Aero, Ltd., West Coast subsidiary.

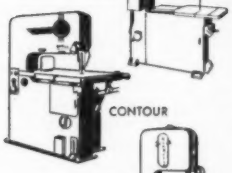
Verner P. Matthews has been named chief engineer, Buick Motor Div., General Motors Corp., Flint, Mich., succeeding **Charles A. Chayne,** named vice president of General Motors in charge of engineering. Mr. Matthews formerly worked for Buick as an assistant chief engineer.

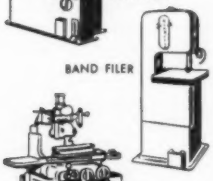
DoALL

INDUSTRY'S NEW SET OF TOOLS


CONTOUR-MATIC

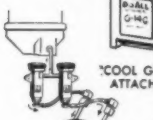
ZEPHYR

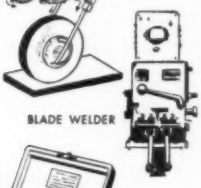

CONTOUR


BAND FILER

TOOLROOM GRINDER

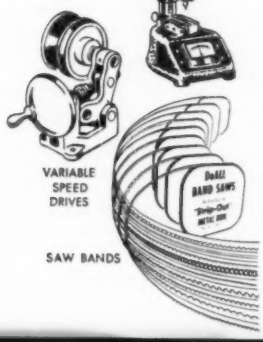
CRUSH GRINDER


"COOL GRINDING" ATTACHMENT


BLADE WELDER

GAGE BLOCKS

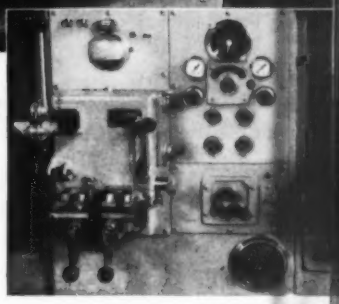
GAGE ACCESSORIES



VARIABLE SPEED DRIVES

SAW BANDS

42 HOURS SAVED over any other machining method. This 327 lb. High Tensile Iron Forming Die was band machined on the DoALL Contour-matic.



NEW DoALL CONTOUR-MATIC IS MORE THAN JUST A MACHINE TOOL

The new DoALL Contour-matic is the first Band Machine that is a true production machine tool.

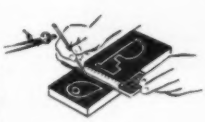
1. Has the rigidity of a machine tool.
2. Has a traveling work table.
3. Has centralized hydraulic controls.
4. Operates with minimum human effort.

AND it goes beyond a machine tool

1. Cuts every known material.
2. Has a wider range of tool speed.
3. Uses 27 kinds of cutting tools.
4. Saves time and material by cutting directly to a layout line.

Write for a demonstration— See it work on your own jobs

Model MP-20
DoALL Contour-matic


TOOL STEEL

BENCH FILER

The DoALL Company

Des Plaines, Ill., U.S.A.

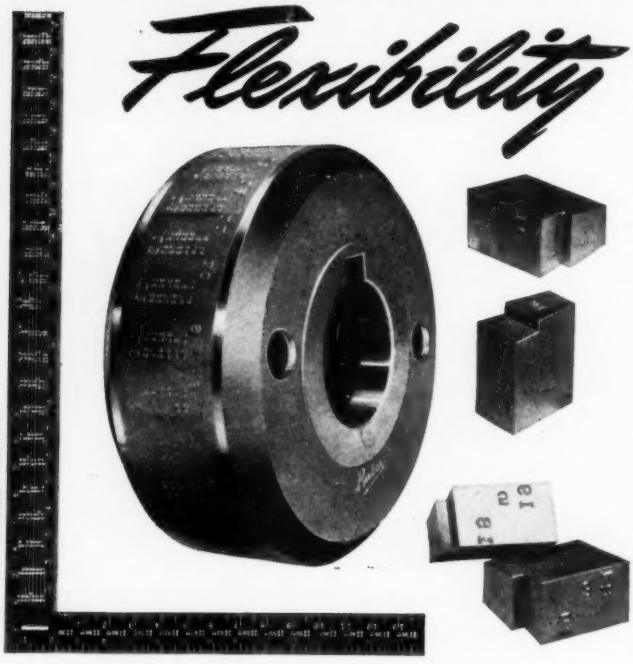
Cable Address: DoALL, Des Plaines

DoALL Stores In Key Cities

Factory Trained Representatives Everywhere

BUILT-IN MARKING DIE

Flexibility



WITH PARKER'S INTERCHANGEABLE SEGMENT ROLL MARKING DIE

- One roll marking die to tackle the exacting job of marking thousands of carpenter's squares. Clear accurate lettering was just as sharp for the 1000th impression as for the first.
  Individual segments can be removed, changed or replaced in seconds. One Parker Roll Die does the job of dozens of solid roll dies.
- The *flexibility* of Parker's Patented Taper Lock roll marking dies is solving difficult marking problems — saving down-time — saving money — every hour, every day for cost-conscious progressive manufacturers. This is but one of the exclusive Parker marking dies.
- For a better mark on *your* product, faster, cleaner, and at less production cost — investigate the *flexibility* of Parker's facilities. From stock marking numbers to specially engineered marking devices. Mechanical engraving and embossing. Parker marking dies for steel, brass, aluminum, plastic or wood.

SEND FOR THE *PARKER BLUE BOOK*

Steel Stamps
Marking Dies
Coining Dies
Embossing Dies
Mechanical Engraving and Special Marking Projects.
Be sure to have the *Parker Blue Book* in your file.

THE PARKER STAMP WORKS, INC.
MARKING DIE & MACHINERY DIV.
FRANKLIN AVENUE • HARTFORD, CONNECTICUT

by Parker

Julius Klein, vice president and sales director of Caloric Stove Corp., Philadelphia, has been elected president, succeeding **Nathan R. Klein,** named chairman. Other officers: **Meyer Klein,** vice president; **J. W. Roberts,** vice president in charge of manufacturing; **Harry W. Klein,** treasurer, and **B. Spencer Baker,** secretary.

C. A. Rystogi has been named manager of manufacturing of the General Electric Company's Household Refrigerator Div., Erie, Pa. He succeeds **W. B. Hill,** who died Nov. 22. He was named assistant manager of manufacturing recently. **William Batchelor** was recently named manager of the GE Appliance & Merchandise Dept. hand iron factory, Ontario, Calif., succeeding **William H. Tangeman,** retired after 16 years in that position. Mr. Batchelor has been assistant works manager since 1933.

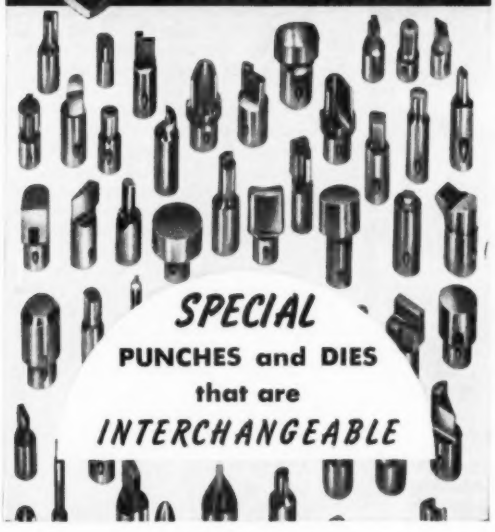
Oscar S. Straus, treasurer, American Smelting & Refining Co., has been elected a director of the company.

Domenic A. DiTirro has been named to head up sales and technical service engineering divisions of Ross Operating Valve Co., Detroit. He was formerly with Parker Appliance Co., Cleveland, as chief research and development engineer.

T. H. Creden

T. H. Creden, eastern district tubular products sales manager for A. O. Smith Corp., Milwaukee, has been named assistant manager of the Tubular Div. He will aid **Dennis F. McCarthy,** division manager, whose responsibilities have been expanded to include those of vice president and general manager of A. O. Smith Corp. of Texas, operators of a new pipe mill at Houston. Succeding Mr. Creden in New York is **Walter D. Wood,** who was Boston branch manager.

INTERCHANGEABLE PUNCHES and DIES



Punches and dies with irregular shapes, for combination piercing and forming, or from special alloys, can be completely interchangeable just as all standard R-B punches and dies. This feature and the use of standardized R-B retainers saves time and money in the design, construction and operation of a die set.

If you need special punches, dies or components, whether or not you desire the R-B interchangeable feature, we make them for you promptly—and to your specifications.

Get in touch with Allied and have your special punch and die requirements filled quickly . . . correctly . . . economically.

Get the **WHOLE STORY** *in this* **FREE CATALOG**

Complete information on standard and special interchangeable punches, dies and die-making components. Yours for the asking.

ALLIED PRODUCTS CORPORATION
RICHARD BROTHERS DIVISION
DEPARTMENT 52
12605 BURT ROAD • DETROIT 23, MICHIGAN

Also Produced in Allied's Four Plants... HARDENED AND PRECISION GROUND PARTS • STANDARD CAP SCREWS • SPECIAL COLD FORGED PARTS • SHEET METAL DIES • ALLITE DIES CAST OF ZINC ALLOY • JIGS • FIXTURES

THE TOUGHER THE CUTTING JOB . . .

. . . THE BETTER THE OPPORTUNITY FOR *abrasive cutting*

Here's one way to open the door to savings . . . at least it's the *right method* . . . abrasive cutting!

And the *right* abrasive wheels are Allison. Whether you're cutting steel, glass, non-ferrous metals or ceramics . . . tube, rod, bar stock or shapes . . . Allison Wheels cut at high speeds, accurately to a few thousandths, with little or no need for after-finishing.

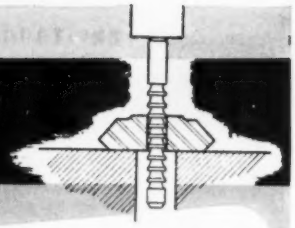
Let one of our qualified specialists – an Allison Abrasive Cutting Expert – recommend the right equipment and right wheel to help you cut costs where you're cutting!

We like tough jobs

. . . consult us about yours!

THE ALLISON COMPANY
257 Island Brook Ave.
Bridgeport 8, Conn.

Allison
ABRASIVE CUTTING WHEELS



HELPFUL HINTS ON INCREASING BROACH LIFE

Page C-4

OILS FOR BROACHING

HEAVY DEMAND ON CUTTING FLUID

Broaching places a great demand on the cutting fluid due to the large amount of metal being removed and the necessity for maximum broach life and finish.

Stuart's THREDKUT and related products, due to their high effective sulphur content, have been outstanding for the most severe broaching work. Active or effective sulphur in an oil serves as an anti-weld agent preventing metal seizure, welding and scuffing.

QUICK FACTS!

SLOW SPEED BROACHING

For unusually slow speed broaching of ferrous materials it is often desirable to use oils of heavier viscosity (such as THREDKUT #25) that will not drain off of the broach and the work before it has completed its mission.

GOOD RULE OF THUMB

When excessive front clearance wear is observed on the cutting teeth of the broach, DECREASE active sulphur in the oil by diluting with paraffin oil or other blending oils. When poor finish is encountered due to pick-up and welding, apply Stuart's THREDKUT or THREDKUT #99 straight.

USE OF WATER-MIX CUTTING FLUIDS

On some flat surface broaching and on round hole work it is often desirable to use a water-mix cutting fluid of top quality. Stuart's SOLVOL, a heavy duty "soluble" oil, is widely recommended.

PROOF!

"With their regular oil they only broached 12 pieces when the broach wore badly and bugged. This is a 4140, 240-270 Brinell forged gear blank with a 1" hole and ¼" deep keyway to broach at one pass with a combination broach, 1' for the round hole first, followed by 2' for the keyway.

"They put in THREDKUT #99 and the broach was still in good condition after running 1500 pieces." WRITE FOR LITERATURE and ask to have a D. A. Stuart representative call.

D.A. Stuart Oil CO.

2729 S. Troy Street, Chicago 23, Illinois

Earl Collins has been named assistant division superintendent, Styron Div., Dow Chemical Co., Midland, Mich. **Richard C. Smeltzer** was named production superintendent of one of the Styron production wings. **R. E. Peterson** was named director, Styron color laboratory, and **J. L. Williams** was named director, Styron control and inspection laboratory.

Robert C. Tyson was elected vice president, United States Steel Corp., Pittsburgh. He joined U.S. Steel in 1939 as assistant audit supervisor, and was named comptroller on Feb. 28, 1950. He will continue as comptroller in addition to his new post.

Edwin S. Ladley was named assistant director of purchases, Hercules Powder Co., Wilmington, Del. He succeeds **William L. Hewes,** retired.

Henry F. Devens has been named manager, East Alton sales office, Western Brass Mills Div., Olin Industries, Inc. **H. L. Kay** was named manager, New Haven, Conn., sales office of Western Brass Mills.

Gordon Fox, Harry Naismith, and **W. B. Clemmitt** have been named divisional vice presidents in the Engineering & Construction Div., Koppers Co., Inc., Pittsburgh. All have been affiliated with Freyn Engineering Co., a wholly-owned subsidiary, Open Hearth Combustion Co. Freyn now ceases to be a company subsidiary and becomes a department of Koppers Engineering & Construction Div., under direction of **W. C. Snyder, Jr.,** vice president and manager of the Metallurgical Dept. of the division.

Kenneth M. Allen

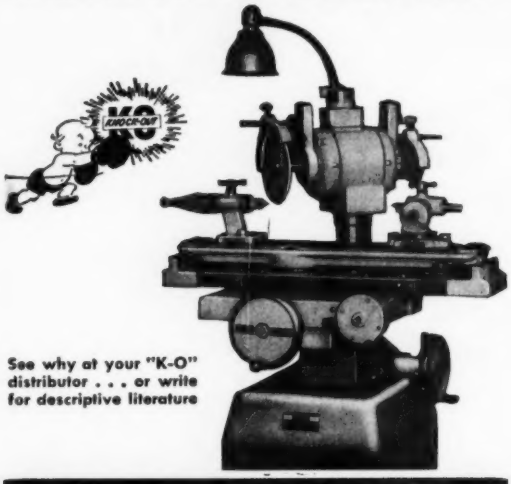
Kenneth M. Allen was elected a director of Rockford Machine Tool Co., Rockford, Ill. He has been with the firm since 1935 and will continue to serve in his present position as sales manager.

the book of the year!

YOURS FREE . . . on your company letterhead . . .

The OK Tool Company, Wilton, New Hampshire
Division Williams & Hussey Machine Company, Inc.

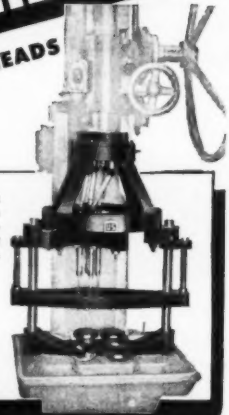
There's a reason . . . 85% of all popularly-priced Tool and Cutter Grinders sold are *"Knock-outs"*



See why at your "K-O" distributor . . . or write for descriptive literature

K. O. LEE CO.
ABERDEEN, SOUTH DAKOTA

For Cost Savings and Accuracy
Use U.S. DRILL HEADS
ADJUSTABLE, MULTIPLE DRILL HEADS



The setup at the right shows two different work pieces. The holding fixture has locators for both pieces and the bushing plate has drill guide bushings for both pieces. Work is held in position by spring pressure on the bushing plate while drilling.

Fits any machine 2 to 10 Spindles

WRITE TODAY
for 1951 Catalog — Dept. T.

Three different capacities, ¼", ½", ¾" in cast iron.

ALSO MANUFACTURERS OF ALL TYPES OF FIXED CENTER HEADS.

Erickson Precision Collets furnished on ¼" capacity head.

US HEADS
SINCE 1915

UNITED STATES DRILL HEAD CO. CINCINNATI 4, OHIO

Henry N. Schumacher has been named superintendent of the cold strip mill of Inland Steel Co., Chicago. **William J. Walsh** was named superintendent of Inland's tin plate department. These two departments of the company's Indiana Harbor works previously operated as a unit under supervision of **Alfred J. Castle,** who was transferred to inactive status along with **Harry C. Barnes,** cold strip superintendent, and **Stuart A. Koegle,** tin plate superintendent. **John A. Keckich** was transferred from the labor relations department to the cold strip mill as assistant superintendent. **Edward J. Gardner,** formerly superintendent of blast furnaces and coke ovens, was named assistant to **Hjalmar W. Johnson,** vice president, and will move to the Chicago headquarters. **Lee B. Luellen** was named assistant general superintendent, in charge of primary operations and mills. **J. Foster Mayberry** was named assistant general superintendent, in charge of the flat rolled departments. **James F. Peters** was named superintendent of blast furnaces, and **William C. Kostbade** was named superintendent of hot strip mills.

George W. Fraker, Jr., has been named to head a new Ordnance Div., of Elgin National Watch Co., Elgin, Ill. The division, to be headquartered at the company's Lincoln, Neb., plant, will handle mechanical time fuzes and other ammunition components. Mr. Fraker was with the Navy Bureau of Ordnance during World War II.

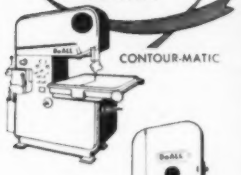
K. B. Winstead has been named general manager of sales, Oil Well Supply Co., Dallas, Tex. He has served as assistant general manager of sales for the past three years. He succeeds **M. F. Hazel,** recently named director of engineering.

Charles W. Beauchamp has been named assistant sales manager for silent and roller chain, Ewart plant, Link-Belt Co., Chicago. **H. Merrill Bowman** has been named assistant sales manager, Ewart plant, for Ewart general products.

Thomas W. Russell, Jr., has been named assistant general purchasing agent, American Brake Shoe Co., New York.

Raymond C. Gaugler has been elected president, American Cyanamid Co., Bound Brook, N. J., succeeding the late **William B. Bell** who died Dec. 20, 1950. Mr. Gaugler has been executive vice president since 1947.

DoALL
INDUSTRY'S NEW SET OF TOOLS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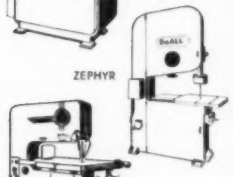
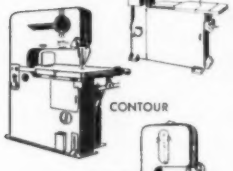
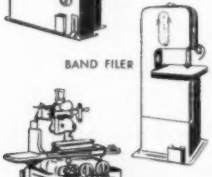
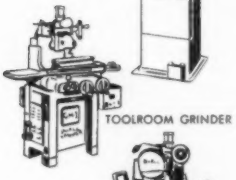

ZEPHYR

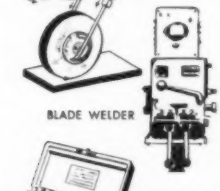

CONTOUR


BAND FILER


TOOLROOM GRINDER

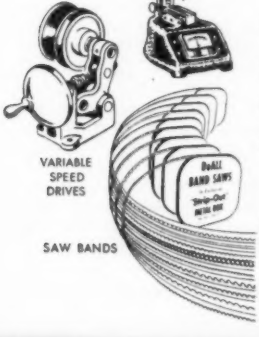
CRUSH GRINDER

"COOL GRINDING" ATTACHMENT


BLADE WELDER

GAGE BLOCKS

GAGE ACCESSORIES



VARIABLE SPEED DRIVES

SAW BANDS

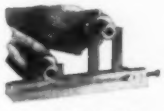
IT'S IMPOSSIBLE to have GOOD INSPECTION without GAGE BLOCKS

Your Plug Gages, Ring Gages, Snap Gages, Dial Indicators, Comparators, Micrometers, and other shop measuring tools cannot measure accurately unless they are used with, and regularly checked against, a reliable set of Precision Gage Blocks.

The only way Gage Blocks are an expense is when you don't have them to use. Without them, you lose more than many times their cost in rejects, material and labor.

DoALL Gage Blocks and Accessories are the best in the world today. Our Gage Specialists can prove it to you. Write for proof today.

DoALL MOBILE INSPECTION UNIT contains a completely integrated set of Precision Inspection Tools.


Gage Block Holders

Optical Flats

Comparators

Dial Indicators

TOOL STEEL

BENCH FILER

The DoALL Company
Des Plaines, Ill., U.S.A.
Cable Address: DoALL, Des Plaines

DoALL Stores In Key Cities

Factory Trained Representatives Everywhere

"67,000 HOURS of trouble-free service"

...P. R. MALLORY & COMPANY REPORTS

on Six Smith & Mills Shapers

That record, coupled with comments like: "holds very close tolerances" . . . "versatility, speed and ease of operation" . . . "quick changeability" indicates another thoroughly satisfied Smith & Mills Shaper user.

This noted Indianapolis manufacturer of electro-chemical, electro-mechanical and metallurgical products uses a battery of six Smith & Mills Patented Ram Shapers in their Welding, Contact and Special Metals Divisions. These fine machine tools operate 8 to 10 hours per day, 5 to 6 days per week, 52 weeks per year. The metal being worked is tungsten based alloys containing silver, copper and special copper alloys . . . ranges from 70 Rockwell B to 50 Rockwell C.

Cost-cutting operations like these will pay in your shop too. Get the facts on Smith & Mills superiority and profit-plus features. Available in 10 sizes ranging from 12" to 36", in plain or universal type, in Economy, Standard and Heavy Duty Patterns.

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SMITH & MILLS SHAPERS, Inc.
DIVISION OF HAMILTON-THOMAS CORP.
HAMILTON, OHIO

I. R. Walker has been named general manager, Saw Div., R. Hoe & Co., Inc., New York. He had been manager of the division's Birmingham plant since 1932. **D. Beisinger,** for several years at the home office in charge of the Saw Div., has returned to Portland, Ore., to handle Pacific Coast saw operations. **E. J. Williamson,** former Pacific Coast manager, has become manager at Birmingham, and **C. F. Ellefson** was named Birmingham plant superintendent. **W. S. Whitten** continues as Birmingham office manager.

Irwin F. Pink has been named executive vice president, Cambridge Wire Cloth Co., Cambridge, Md. **Edward N. Evans** was named vice president and general manager, and **Nina E. Pink** was named secretary and treasurer.

Gunnar Palmgren has been named assistant vice president, SKF Industries, Inc., Philadelphia. **Arthur S. Roberts** was named general counsel. **Jack R. Bremer** was named assistant purchasing agent. SKF President **Richard H. DeMott** was recently elected to the board of directors of Anti-Friction Bearing Manufacturers Association.

L. W. Evans and **George W. Fay** have been named vice presidents of Rheem Mfg. Co., Richmond, Calif. Mr. Evans, who joined Rheem in 1932, will be vice president in charge of engineering and development and will be located at the South Gate, Calif., plant. Mr. Fay will be vice president and controller with headquarters in the main office at Richmond. He joined Rheem in 1944 after 17 years with Hydrill Corp., Los Angeles.

J. J. Carlson, assistant general sales manager of Kaiser Steel Corp., Oakland, Calif., has been named general sales manager. He joined Kaiser in 1944 after several years with Inland Steel Co.

Walter S. Peper has been named sales representative, Lewis-Shepard Products, Inc., Watertown, Mass., serving lower Manhattan from the New York area sales and service headquarters in North Bergen, N. J. **Dave G. Richmond,** former Connecticut representative, will be in in charge of sales in the Brooklyn and Jersey City areas. **Ross McIver,** for many years Newark, N. J., representative, is now actively connected with the New York sales and service at North Bergen. He will continue to handle sales for the Newark area.

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● If you are planning to swing into shell and case manufacture or want to bid on a contract, H-P-M's reactivated ORDNANCE equipment department can supply you with complete information on the press equipment needed for producing these shells and cases—in sizes that have been proposed for industry to bid upon.

and can supply you with all these details . . .

- **Press equipment cost**
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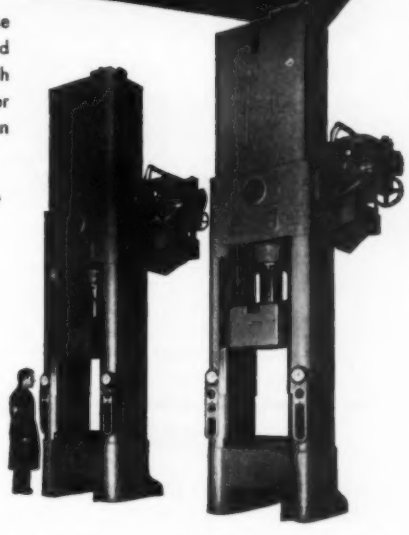
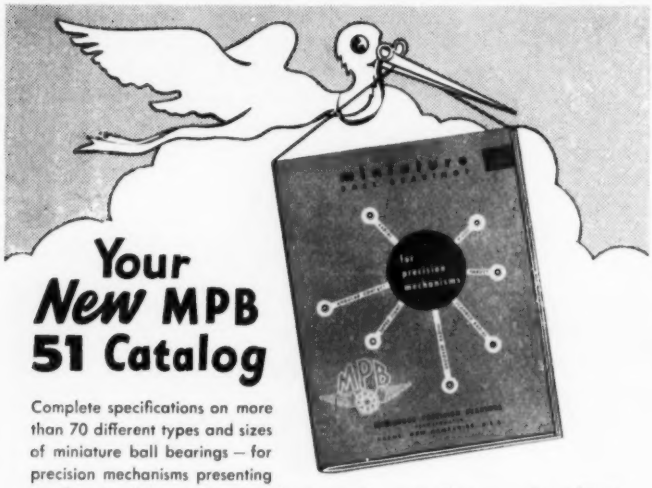


SERVING INDUSTRY THROUGH HYDRAULICS



Your *New* MPB 51 Catalog

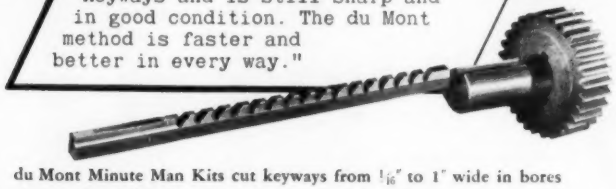
Complete specifications on more than 70 different types and sizes of miniature ball bearings — for precision mechanisms presenting anti-friction, light weight, high load capacity, and other unusual conditions. This new and expanded catalog contains complete and valuable information, including most recent developments on weights, loads, design data, applications and special bearings. Send for your copy today — ask for Catalog AM-51.

MINIATURE *Precision* BEARINGS
INCORPORATED
KEENE, NEW HAMPSHIRE
"Suppliers to the World's Foremost Instrument Manufacturers"

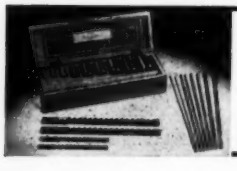
"KEYWAYS A PENNY APIECE"

says R. L. Beekman, Manager
Beekman Engineering Co., Ft. Lauderdale, Fla.

"We have been using Minute Man Broaches, cutting ¼" x 2¼" keyways in cast iron worm gears and cams. One broach has cut over 500 keyways and is still sharp and in good condition. The du Mont method is faster and better in every way."



du Mont Minute Man Kits cut keyways from 1/16" to 1" wide in bores from ¼" to 3" by 1/16" steps. They do the job, by hand, *in one minute!*



MAIL THIS COUPON

The du MONT CORPORATION, Greenfield, Mass.
Please mail Minute Man Descriptive Folder & Price List A

Name .....
Company .....
Address .....

Frank Hallberg has been named chief engineer, Ross Operating Valve Co., Detroit. He was previously with Clinton Machine Co., Clinton, Mich., and formerly chief engineer, Detroit Industrial Engineering Co.

Arthur V. Wiebel has been elected president, Tennessee Coal, Iron & Railroad Co., Birmingham, Ala., succeeding **Robert Gregg**, retired. **J. M. Spearman** succeeds Mr. Wiebel as vice president in charge of operations. **James C. Gray** succeeds Mr. Spearman as manager of manufacturing operations. **John Pugsley**, comptroler, was named executive vice president, and **Hartwell A. Greene**, assistant comptroller, succeeded Mr. Pugsley. **Elmer F. Harris** has been named assistant manager of manufacturing operations. **John R. Hunt** succeeds Mr. Harris as assistant general superintendent, Fairfield sheet and tin mill. **Roman J. Meyer** was named superintendent of the sheet mill, and **Donald A. Haarbauer** was named his assistant.

Jim F. Smith has joined the Jobber Div. of Clarostat Mfg. Co., Inc., Dover, N. H.

Louis K. Whitcomb has been named manager of product development, Sharon Steel Corp., Sharon, Pa.

H. Sturgis Potter was named general sales manager, Carpenter Steel Co., Reading, Pa., to succeed **R. V. Mann**, who until his recent death was vice president in charge of sales. **Frederick W. von Raab** has been named manager of warehouse distribution.

Charles F. Alexander has been named manager, Industrial Dept., National Safety Council.

A. P. Hall, vice president and general manager of sales, American Chain & Cable Co., has been named a member of the board of Walter Kidde & Co., Inc., New York.

S. T. Mackenzie, head of the Philadelphia office of Babcock & Wilcox Co., New York, has been named to the newly created post of sales manager. **R. W. Buntin** becomes district sales manager at Philadelphia. **Frank E. Hutton** was named executive assistant in charge of application and sales of process equipment and alloy castings.

M. J. Donovan has been named assistant to the president of Franklin Railway Supply Co., New York.

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Send me book(s) corresponding to the numbers encircled below for 10 days' examination on approval. In 10 days I will remit the price of the book(s) I wish to keep, plus a few cents delivery charge, and return unwanted books postpaid. (We pay delivery if cash accompanies coupon; same return privilege.)

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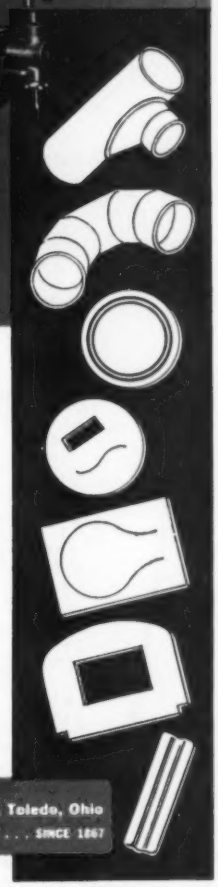


FOR HEAVY DUTY CUTTING IT'S THE BAKER TRU-EDGE SHEAR

CHECK THESE FEATURES:

- **BURR FREE EDGE** no finishing operation necessary
- **EASY TO OPERATE** no starting hole necessary
- **48" THROAT**
- **DOES BEADING AND FORMING**
- **CUTS 10 TO 36 FEET PER MINUTE**
- **ONLY 5 MOVING PARTS**
- **CAPACITY: 6 GAUGE IN MILD STEEL 7 GAUGE IN STAINLESS STEEL**
- **DELIVERY FROM STOCK**
- **COST? . . . $1960.00 F.O.B. TOLEDO**

In actual cases on record, the Baker Tru-Edge Contour Shear cuts operating time to less than 1/10 of the time required on previous machines.

BAKER BROS., Inc. Toledo, Ohio

MAKERS OF BETTER MACHINE TOOLS . . . SINCE 1867

The Tru-Edge Contour Shear is made by Baker Bros., Inc., under license from Industrial Devices Corp., Detroit, Mich.

From the *American Machinist* Library of *Tips for Top Shop Men*

ONLY two of your possessions increase in value proportionally with price inflation. One is time, the other knowledge. You can employ both productively to build security, or squander them.

MICROSTRUCTURE, rather than composition, may frequently be the key to successful machining of a part. Two pieces that look alike and were made alike may be entirely different in their reaction to a tool.

Independent laboratory test for a leading machine tool builder reveals

"BLU-MOL"® OUTPERFORMS ALL OTHER BLADES TESTED

Some time ago, a leading machine tool builder tried out a number of different hack saw blades under normal production conditions. "Blu-Mol" blades proved so outstandingly superior that the company decided to find out why and sent them to an independent testing laboratory. Here is the report they received:

1-3-50

Sample No. 407564

The "excellent" service given by this blade is apparently the result of three factors:

First, homogeniety of steel. The stock shows no evidence of high concentration of carbides in stringer formation which creates weak spots and brittleness.

Second, the relatively high hardness (C64.5) combined with fine grain size gives the necessary combination of tooth strength and toughness needed for a long service life. Usually hardness above C64 is attained at the sacrifice of grain fineness.

Third, surface condition. There is no evidence of lowered surface carbon content so commonly found in hack saw blades. This manifests itself by greater resistance to tempering and a consequent retention of a larger percentage of white martensite.

"Blu-Mol" steel is part of the secret of "Blu-Mol's" tremendous cutting ability. But even more important is the exclusive, precision heat treating process used only on Millers Falls blades. Try "Blu-Mol" and see for yourself how this outstanding blade can cut your hack sawing costs. Write today for a demonstration on your own work, in your own machines.

MILLERS FALLS COMPANY • GREENFIELD, MASS.

MILLERS FALLS TOOLS
SINCE 1868
The Mark of Superiority

Charles H. Merbitz has been named sales representative, Type Metal Dept., Federated Metals Div., American Smelting & Refining Co., and will make his headquarters at Federated's Philadelphia office.

F. W. Busch and **Ed Somerville** were named "division managers of 1950" by Aro Equipment Corp., Bryan, Ohio, for their sales attainment, territory management, handling of service problems, and contributions to the overall sales picture. Mr. Busch manages Aro lubrication equipment in the Livonia, N. Y., territory, and Mr. Somerville is manager for Aro industrial tools in the Chicago territory.

F. L. Yetter has been named senior vice president, C. H. Wheeler Mfg. Co., Philadelphia. He rejoins the company after a 20-month period during which he served as director of foreign affairs for the Kuljian Corp. In 1946 he was elected vice president and assistant general manager, resigning in April, 1949. C. H. Wheeler Mfg. Co. now joins Economy Pumps, Inc., Klipfel Mfg. Co., Liberty Planers, Inc., and Smith & Mills Co., as a division of Hamilton-Thomas Corp.

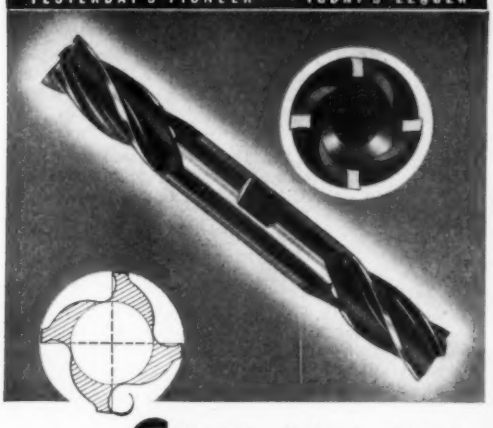
Earl H. Schaefer has been named chief manufacturing engineer, Manufacturing Div., Elgin National Watch Co., Elgin, Ill. **Werner M. Lienert** succeeds Mr. Schaeffer as assistant manager of the Elgin plant in Lincoln, Neb., under **Elmer Jurs**, plant manager.

Edward J. Hanley has been elected president of Allegheny Ludlum Steel Corp., Pittsburgh, succeeding **E. B. Cleborne**, resigned. **Clark W. King**, vice president and treasurer, succeeds Mr. Hanley as executive vice president, retaining the position of treasurer. Mr. Cleborne will continue to serve the company as a director and vice president. **W. B. Pierce**, manager of sales development and engineering service, has been named technical director, succeeding **Frank B. Lounsberry**, retired.

Isaac Harter, board chairman, Babcock & Wilcox Tube Co., Beaver Falls, Pa., has been awarded the Newcomen Medal of the Newcomen Society "for achievement in the field of steam."

John C. Koch has been named vice president in charge of sales, Conoflow Corp., Philadelphia.

YESTERDAY'S PIONEER . . . TODAY'S LEADER



CHIPS CURL OUT INSTEAD OF CLOGGING with WELDON CUPPED-END END MILLS

BETTER PERFORMANCE . . . LONGER TOOL LIFE

Over twenty-five years ago Weldon opened the door to higher speeds and faster feeds by developing a scientifically designed end mill tooth. This hollow ground tooth with its curved cutting face allows the chips to *curl* out without clogging. A further means to this purpose is the Weldon "cupped-end" which prevents chips from clogging the end teeth because it eliminates pockets which trap chips.

Another special feature originated by Weldon is the double back-off on the tooth, which gives greater support to the cutting edge, prolonging the life of the tool.

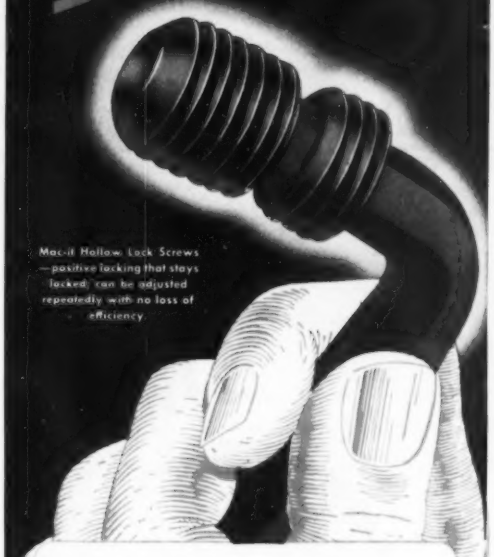
Weldon distributors throughout U.S.A. and Canada carry complete stocks to serve you.

THE WELDON TOOL CO. *Cleveland, Ohio*

3000 WOODHILL ROAD

IT'S A *Mac-it*®

PRONOUNCED "MACK-IT"



Mac-it Hollow Lock Screws —positive locking that stays locked; can be adjusted repeatedly with no loss of efficiency.

BETTER, FASTER SERVICE WITH THIS *COMPLETE* MAC-IT LINE!

Because many standard types of Mac-its are stocked throughout the country for quick delivery, and because specials can be engineered to your own specifications, you'll find it pays to investigate Mac-its *first*.

Mac-it's 38 years' experience in the manufacture of heat-treated, alloy steel screws is your assurance of precision, uniformity and strength. Sold through leading industrial distributors from coast to coast and in Canada. Write for new catalog today!

Other Mac-it products include:

Socket Head Cap Screws	Socket Screw Keys
Hollow Set Screws	Square Head Set Screws
Stripper Bolts	Hexagon Head Cap Screws
Hollow Pipe Plugs	. . . and many others

Marketed Nationally Since 1913 by

STRONG, CARLISLE & HAMMOND COMPANY

Cleveland 13, Ohio

Manufactured by MAC-IT PARTS COMPANY, Lancaster, Pa.

John R. Howland has been named to head a newly created Office of Product Research for Stewart-Warner Corp., Chicago. Prior to and since the war, Mr. Howland was assistant to the president of Zenith Radio Corp.

Donald B. Harris has been named technical assistant to the president of Airborne Instruments Laboratory, Mineola, N. Y. He was formerly executive assistant to the director of research, Collins Radio Co., Cedar Rapids, Iowa.

W. A. Neumann, Jr., has been named manager, IMO-De Laval Products Div., De Laval Steam Turbine Co., Trenton, N. J. He has been acting manager of the division for the past year. He will continue also as assistant treasurer of the company.

H. J. Henke has been named superintendent of the East St. Louis, Ill., bitumastic protective coatings plant of Koppers Co., Inc., Pittsburgh. He was superintendent of the Verona, Pa., plant of the Tar Products Div.

BUSINESS ITEMS

Black & Decker Mfg. Co., Towson, Md., has opened a large new sales and service branch at 881 W. Delavan Ave., Buffalo, N. Y. The new building increases facilities nearly 400% over Black & Decker's previous location on E. Utica St.

J. Alex Gordon & Co. is the new name of the former Gordon & Kinney, Inc., sales representative for Automatic Transportation Co., Chicago, covering the Detroit area. Edward W. Addis has been named vice president of the firm.

• **Whiton Machine Co.,** New London, Conn., has appointed the following representatives: Allen Steel & Supply Co., Ft. Wayne, Ind.; Oatis Machinery Co., Indianapolis; Peoria Tool & Engineering Co., Peoria, Ill.; E. L. Essley Machine Co., Chicago; Bond Supply Co., Kalamazoo, Mich.; Anderson Machine Tool Co., St. Paul; Martin & Prestegaard Co., Minneapolis; Sterling Products Co., Chicago, and Colcord-Wright Machinery & Supply Co., St. Louis.

Milwaukee Electric Tool Corp. has named William A. Smith, Philadelphia, its repersentative in eastern Pennsylvania, southern New Jersey, Delaware, Maryland, and Washington, D. C.

This man...

BRINGS YOUR WORLD TO YOUR DOOR!

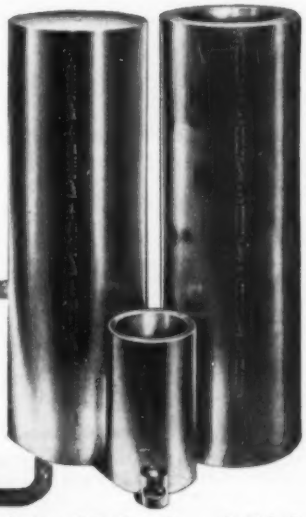
Three billion dollars worth of industrial equipment, tools, and supplies is quite an order even today. Yet there is a man in these United States who alone supplies to you and other customers approximately three billion dollars worth of such commodities every year.

Consider what it would cost in time, trouble and money every year for you and other manufacturers to find and bring to your plants this enormous quantity of things you use in your business.

Serviceable

"This man" is an industrial distributor or a specialist in certain industrial items. You will find him listed in the classified section of your telephone book—most likely under the heading Bars, bronze or Bearings, bronze. If he is the leading distributor, he almost certainly is the Bunting Distributor. He carries in stock for your money saving convenience Bunting Standard Stock Industrial Bearings, Electric Motor Bearings, and Precision Bronze Bars—ask him for catalog.

There are approximately 2,000 Industrial Distributors serving every industrial section of the United States. In 1948, their total sales were more than $3,000,000,000. They carry an average inventory investment of $500,000,000, turn their stocks over 5 to 6 times per year, fill 200,000 orders per day, have 12,000 outside salesmen and engineers, 10,000 inside telephone order expeditors, operate 8,000 trucks delivering merchandise on which their average net profit is .0292 cents per dollar of sales.



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BRONZE BEARINGS • BUSHINGS • PRECISION BRONZE BARS

THE BUNTING BRASS & BRONZE CO., TOLEDO 9, OHIO

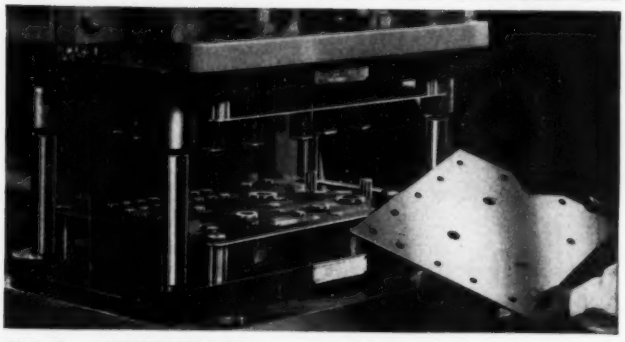
New • Fast • Proven

LOW COST

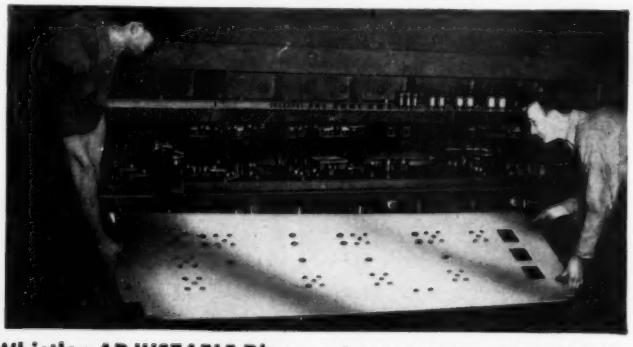
methods for PERFORATING and NOTCHING SHEET METALS

Both methods feature: LOW DIE COSTS

All units and parts are interchangeable and used repeatedly in different arrangements. **INCREASE PRESS PRODUCTION**—Down time is minutes as compared to hours for changeover. For precision work in all types and sizes of presses. **START PRODUCTION *at once.*** Pierce up to ⅛" thick mild steel. Saving money in the best known plants.



Whistler *MAGNETIC* Dies at work in large inclinable press. Magnetized units hold the retainers. No bolting required. A fast, economical method in making up a punch and die set for short or long runs. All parts re-usable.



Whistler *ADJUSTABLE* Dies on ⅛" steel perforating and notching job, using Tee slotted die set. With Whistler Adjustable Punch and Die units production starts within hours instead of weeks. Last minute job changes made quickly.

Here are the complete details with prices and application illustrations. Send for these catalogs. No obligation.

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S. B. WHISTLER & SONS, Inc.

Adjustable, Magnetic, Custom and Cam Dies for all Industry

758 Military Road, Buffalo 23, N. Y.

National Tool Co., Cleveland, has appointed Tri-State Machinery Co., Pittsburgh and Erie, Pa., its sales representative in western Pennsylvania.

Heppenstall Co., Pittsburgh, has appointed W. P. Wooldridge Co., San Franciso, its representative in California, Montana, Idaho, Utah, Nevada, Arizona and New Mexico.

Massachusetts Institute of Technology has begun construction of Sloan Metal Processing Laboratory at Cambridge, Mass. The laboratory, will be completely equipped for all major types of metal forming and machine tool work.

Omni-Metal Castings, Inc., Brooklyn, has been formed by Vicon Casting Corp., Brooklyn, for production of centrifugal precision castings in ferrous and non-ferrous alloys. The plant is at 103 Lombardy St.

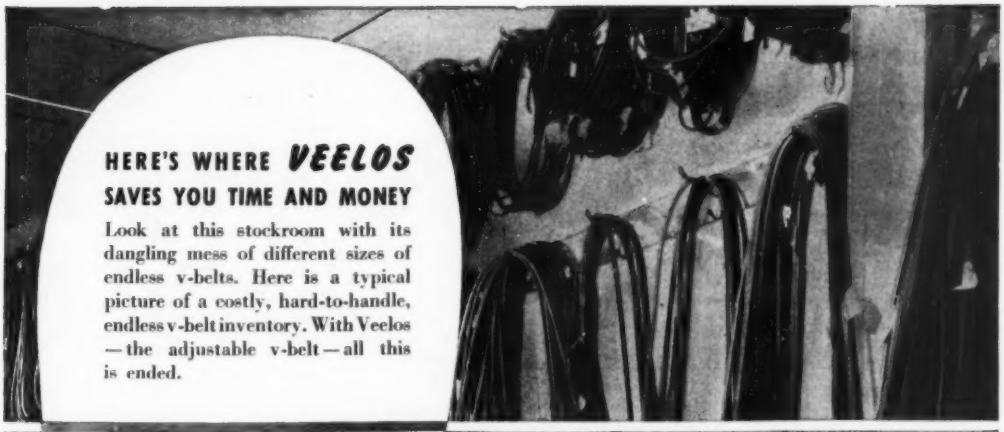
George L. Nankervis Co., Detroit, has purchased **Electro-Mechanical Devices Co.,** Detroit, as a wholly owned subsidiary, to be known as the Electro-Mechanical Devices Div. The two companies have consolidated facilities in a new plant at 19255 West Davison, Detroit.

Elox Corporation of Michigan has been formed through merger of three arc machining companies. Offices are at 740 N. Rochester Road, Clawson, Mich. The new company will manufacture the Electron drill, a motor-driven hard metal drilling machine operating on a new electronic principle, according to John S. Larkin, president. Other electronic drill equipment will be developed.

Allis Seal Corp. has been formed as a wholly-owned subsidiary of Chicago Belting Co., with offices at 113-125 N. Green St. Frederick E. Barth has been named executive vice president of the new company.

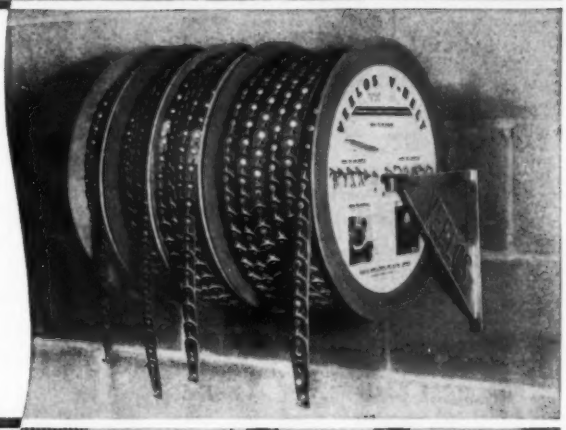
Universal Tool & Stamping Co., Spencerville, Ind., and **Mayer Tool & Die Co.,** Fort Wayne, Ind., have combined plants and moved to Butler, Ind.

American Screw Co. has moved from Providence, R. I., to a modern one-floor plant at Willimantic, Conn. The new plant covers 87 acres. The migration began three years ago when the company was unable to find a suitable site for a new plant in the community where it has done business for 112 years.



HERE'S WHERE *VEELOS* SAVES YOU TIME AND MONEY

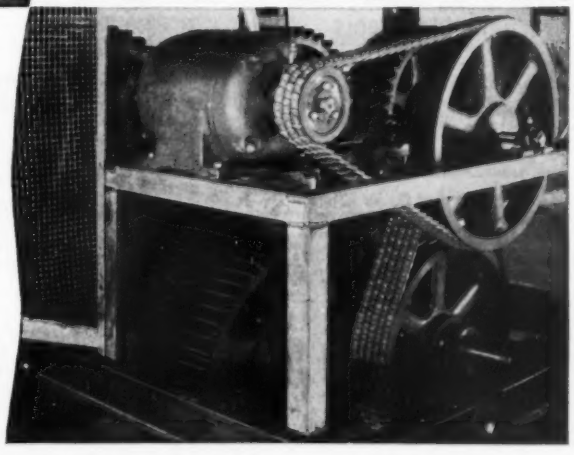
Look at this stockroom with its dangling mess of different sizes of endless v-belts. Here is a typical picture of a costly, hard-to-handle, endless v-belt inventory. With Veelos — the adjustable v-belt — all this is ended.



WITH *VEELOS*, ANY BELT SIZE IS ALWAYS ON HAND

These four reels of Veelos alone can *replace* up to 316 sizes of endless v-belts in the O, A, B and C widths. No more stockroom troubles, no more replacement headaches because Veelos is *always* ready—in the widths you require.

If you are interested in reducing your v-belt costs and increasing your production efficiency, you should have a Veelos Data Book. For free copy of this illustrated book complete with engineering information write*



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Veelos is easy to install *without* dismantling outboard bearings. Veelos runs true for vibrationless, full power delivery. Because Veelos is adjustable, uniform belt tension is easily maintained.

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THE LINK
V-BELT

ADJUSTABLE TO ANY LENGTH • ADAPTABLE TO ANY DRIVE

Made in all widths in three types: regular, oil-proof, static conducting. Also double V in A and B. Packaged on reels in 100-foot lengths. Sales engineers in principal cities; over 350 distributors throughout the country. Veelos is known as VEELINK outside the United States.

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3 important books on TOOL DESIGN

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A valuable reference for the design of press tools and the fabrication of metals in power presses. This edition includes over 1000 press tool designs, types of presses, attachments and pressroom accessories and tells how to use them in die engineering practice. Tells how to simplify presswork, cut costs, save material, perform difficult operations and improve results. Profusely illustrated treatment shows how to select presses, covers workability of materials, and gives many basic tool designs which can be adapted to a wide variety of specific presswork problems. *Second edition, 543 pages, 524 illus., $8.50.*

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Here are drawings and photographs with detailed explanatory text of 90 percent of all the key designs used in tools for presswork. Includes all the necessary mathematical formulas for laying out the assembled dies in a clearly rendered drafting technique—shows dies for producing equipment that reveals basic principles of many key designs that have wide application in fabricating an endless variety of small precision parts —Includes drafting shortcuts. *497 pages, 311 illustrations, $5.50.*

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Demonstrates the best methods for designing, drafting, and using drilling jigs, and tapping and milling fixtures, illustrating the fundamental principles by which all tools must be designed for successful operation. Giving detailed operational functions of tools, mathematical formulas, tool engineering tables, etc., it supplies all the essentials of designing and drafting tools and gives many new ideas for doing machine work and for designing tools. *Second edition, 416 pages, 446 illustrations, $4.50.*

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DRILLING PUNCHING CUTTING SHEARING BENDING

From the *American Machinist* Library of *Tips for Top Shop Men*

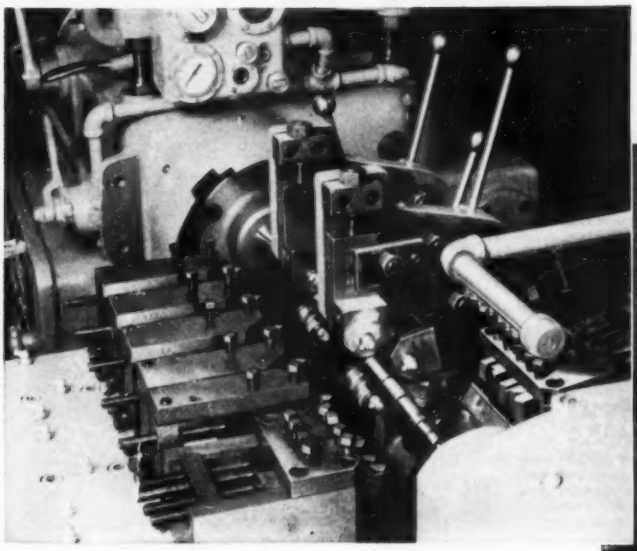
DON'T flaunt your greater income or privileges before your subordinates. No matter how much they like you, their resentment and envy will do you more harm than the flaunting does your ego good.

REMEMBER that human problems need careful study just as do engineering problems. Man is multi-motivated and one prescription won't cure all his ills.

BE suspicious of any figures you hear, and of most of those you see. If they don't correspond immediately to your previous experience, check 'em before you quote or use 'em. The urge to make numbers bigger, or smaller than anything previously reported is overpowering to some people; don't be victimized.

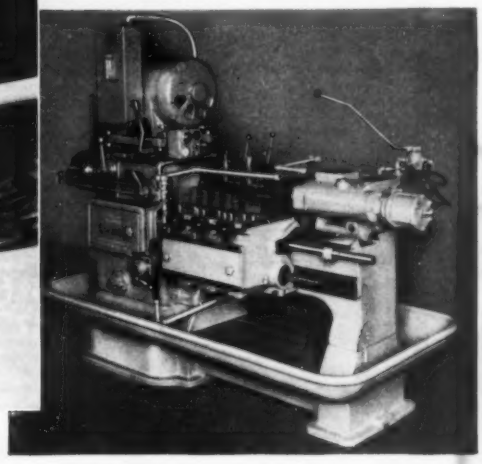
MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE *Lo-swing* PEOPLE" SENECA FALLS, NEW YORK



Left: Closeup view of tooling and steady rests.

Below: Model LR Lo-swing Lathe equipped for machining spinning rolls.



MODEL LR *Lo-swing* LATHE SPEEDS SPINNING ROLL PRODUCTION

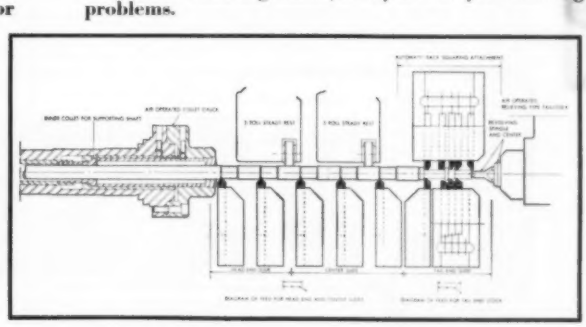
Problem: To turn and face long spinning rolls within close tolerances.

Solution: The Model LR Automatic Lo-swing Lathe selected for this job was equipped with a hollow spindle to permit one-half of the spinning roll to extend into the spindle. This method increased the rigidity of the work and assured closer machining tolerances. The upper right illustration shows the lathe equipped for the first turning operation. Note the relieving type tailstock which swings on hinged joints to facilitate loading work into the collet chuck. The upper left illustration is a closeup view of the tooling and steady rests.

The spinning rolls are turned from ground stock, properly centered on each end. They are supported by the collet chuck, two 3-roll rests, and a tailstock center, as shown in the tooling layout below. This method holds the work very rigidly and assures the close tolerances specified on the turned diameters.

The entire operation is automatic: the operator simply places the roll in position and locks the steady rests on the previously ground bar stock. The machine cycle is then started and continues automatically until all diameters are turned and faced, and the tool slides returned to the starting position. A similar machine and tooling is used for machining the opposite end of the shaft.

Let Seneca Falls engineers assist you with your turning problems.



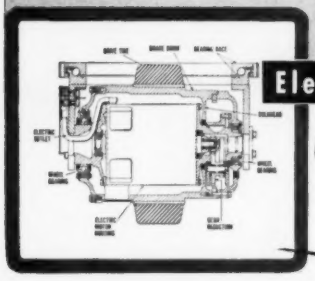
SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

PRODUCTION COSTS ARE LOWER WITH *Lo-swing*

Give MORE *Power* to Manpower

use CLARK powered HAND TRUCKS

ONE BASIC DESIGN
TWO POWER TYPES



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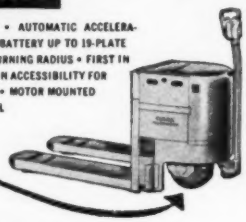
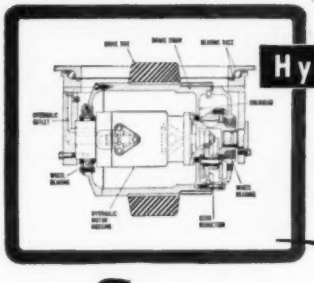
MORE POWER! • AUTOMATIC ACCELERATION • TAKES BATTERY UP TO 19-PLATE • SHORTEST TURNING RADIUS • FIRST IN GRADABILITY, IN ACCESSIBILITY FOR MAINTENANCE • MOTOR MOUNTED IN DRIVE-WHEEL





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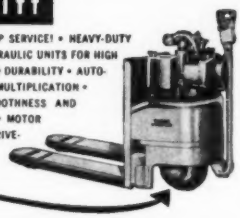

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More power for your manpower can start with our Hand Truck Book. We'll be glad to send you a copy on request.

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Test prove that Star Molyflex Blades cut 23.8% more metal than the average of eight other leading high speed blades tested! That means they're extra tough—and that they cut clean and easy, too. Molyflex high speed steel blades are completely shatter-proof—completely unbreakable in a frame. They're available in a complete range of sizes and pitches. They're made right to handle your roughest, toughest metal-cutting jobs.

STEELRITE METAL-MARKING CRAYONS

These extruded soapstone crayons can be used on hot, cold, damp or grimy metals. Markings withstand pickling—will not affect enamel applications. A complete range of sizes and shapes.

Ask your distributor for free copies of the STAR Wall Chart and STAR Metal-Cutting Booklets. They'll show you how to get maximum cutting results from hand, band and power blades.

The STAR Line is *complete*—there's a STAR Blade that's right for *every* cutting job a hack saw or band saw can handle.

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IN PEACE WASTE IS A SIN...
NOW...WASTE IS A CRIME!

DISSTON
Announces a New
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for tool steel users

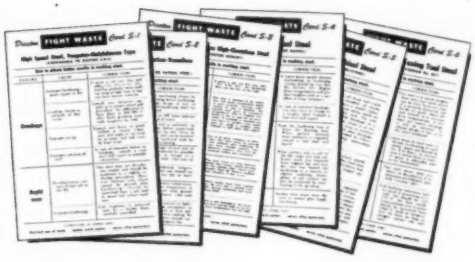
Tool steels rank high on the list of critical materials for industrial expansion. Growing shortages are forcing many users to turn to unfamiliar types of steels for tool production.

NOW DISSTON PRESENTS A PLAN TO STRETCH THE SUPPLY OF AVAILABLE TOOL STEELS—TO HELP YOU GET MORE OUT OF THE STEEL YOU ARE USING —THE DISSTON "FIGHT WASTE" PROGRAM!

DISSTON GIVES YOU "FIGHT WASTE" MATERIAL FREE!

The basis for the program is the use of educational FIGHT WASTE Cards on six basic types of tool steels. These individual cards contain information on the selection, working, and application of tool steels to help you get better tool performance and longer tool life—to help cut waste of vital steels.

These cards are supplied free—without cost or obligation—in quantities desired. Order by number:



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Disston also has FIGHT WASTE instruction cards covering a variety of wood and metal cutting *tools*. These cards provide specific information on the most efficient use and care of tools to reduce breakage, stop waste of material, and increase production. We will send you information on these cards.

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A smaller version of this highly flexible furnace is the No. 654. Four burners deliver 500 to 1800° F. Firebox: 5" x 7¾" x 13½". Available as pedestal or bench style.

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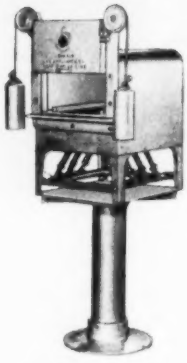
Johnson No. 706 Pedestal Style	$278.00
Bench Style	$250.00
Johnson No. 654 Pedestal Style	$150.00
Bench Style	$124.00

F.O.B. Factory



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Furnaces • Burners • Torches • Valves • Mixers • Blowers

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They will mill keyseats:

- in one cut.
- in offset holes.
- that are straight.
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ALL-HARD REZISTOR HACK SAW BLADES

Recognized for years as top performers, MILFORD All-Hard REZISTORS are even better today! Severe break-down tests, conducted under identical cutting conditions, show today's All-Hard REZISTORS have 30% more endurance, deliver 28% more straight cuts, and are 5% faster than previous REZISTORS. M-2 high speed steel, a new development in metallurgy, enables REZISTORS to withstand friction of high speed cutting — adds hours to the blade's life. Specify these longer-lived time-saving, money-saving MILFORD blades. Select Industrial Distributors can serve you from stock.

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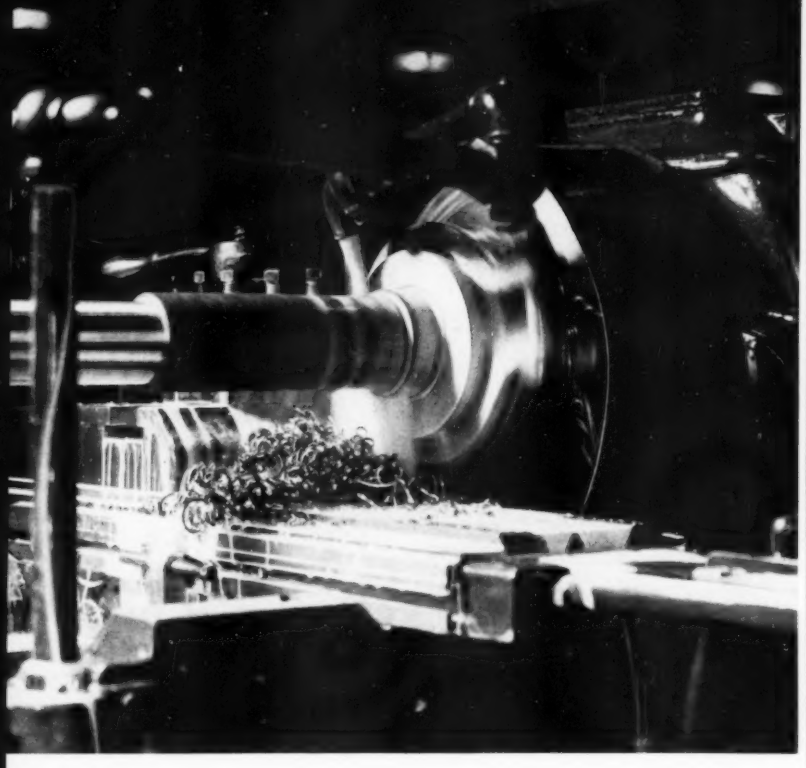

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● Do you have machining operations that give trouble with every cutting fluid you try? When cutting oils are used, tools and work overheat? With water emulsions or soluble oils, are tool life and finish poor? STANICOOL HD Soluble Oil has taken over many such jobs and has saved tools, parts, and machining time.

As a water emulsion, it has excellent cooling ability . . . gives finish and tool life approaching what you can get with cutting oil. It can handle many of your heavy cutting operations . . . save you the costly use of special cutting oils. On top of that, STANICOOL HD gives you the economy of soluble oil and these five advantages:

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Soluble Oil

To take full advantage of this many-purpose cutting fluid, call on the services of a Standard Oil cutting-oil specialist. His headquarters are near your plant. How you can benefit by his on-the-spot service is explained at the right.

Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.

What's YOUR problem?

● Cutting? Stamping? Quenching? Whatever your problem, Standard Oil has a corps of cutting-oil and lubrication specialists located throughout the Midwest to help you solve it. One of these men is near your plant. You can get his services quickly and easily. His wide experience and special training in the use of modern lubricants and cutting fluids will help you make real savings.

Why not arrange, today, for his visit by contacting the nearest Standard Oil (Indiana) office? To start the ball rolling, discuss with him the advantages of:

STANICUT Cutting Oils—These special-duty cutting oils meet today's most exacting requirements and highest production schedules. Grades varying in viscosity and compounding are available, each containing the correct proportions of extreme-pressure and friction-reducing ingredients.

STANOSTAMP Compounds—Here are three established products for stamping or heavy drawing operations on either low-carbon or alloy steels. Water can be added to these paste compounds to provide the most economical applications.

STANOSTAMPS offer maximum protection for dies and work, can be readily removed in conventional washing equipment.

SUPERLA Quenching Oil—From Standard Oil's complete line of quenching oils, this product is recommended for quenching work in systems where cooling facilities are limited and bath temperatures are high. It is a medium-bodied oil of red color. It provides efficient quenching of large forgings.

STANDARD OIL COMPANY (INDIANA) STANDARD

What

NEW STANOIL'S *longer life means to you.....*

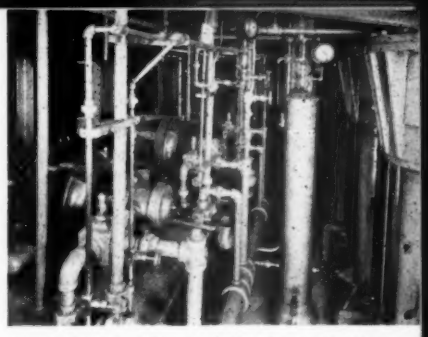
For fourteen years STANOIL Industrial Oils have proved their ability to handle a wide variety of jobs in midwest plants. Now, these established products have been made better than ever! They offer new and important savings in an even wider variety of equipment because:

1. **Greater oxidation stability** in the New STANOILS enables them to stand up under high temperatures of operation, maintain low acidity for long periods of time, and reduce to the minimum deposits caused by oil oxidation.

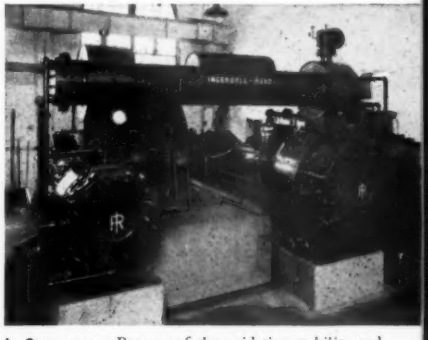
2. **High Viscosity Index and Low Pour Point** enable STANOILS to perform satisfactorily through a wide range of temperatures. They flow readily at low temperatures and do not thin out excessively at high temperatures.

3. **Greater protection against rust** has been provided by the addition of a corrosion inhibitor of an advanced type to all grades of New STANOIL. This inhibitor prevents corrosion trouble by "plating out" on surfaces that tend to rust. New STANOILS have practically put an end to rust and corrosion troubles.

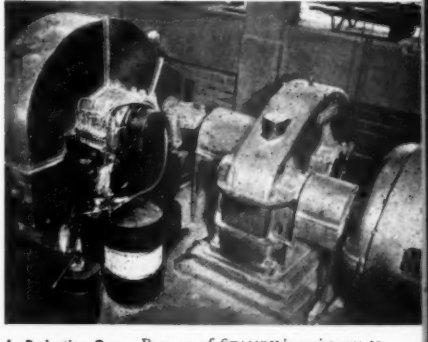
At the right are shown several types of equipment in which the New STANOILS can save you money and maintenance time. A Standard Oil Lubrication specialist will help you find still other applications where versatile STANOILS can replace many special-purpose oils. You can reach this man quickly and easily through your local Standard Oil Company (Indiana) office. Contact him today. Or, if you wish, write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.



In Hydraulic Systems. Because of the high viscosity index and low pour point of the New STANOILS, they provide smooth operation in hydraulic systems regardless of widely varying temperatures. They also eliminate foaming, which is frequently troublesome in hydraulic operation. Their high oxidation stability eliminates deposits that could cause valve sticking and wear.



In Compressors. Because of the oxidation stability and low carbon-forming characteristics of STANOILS, carbon deposits on valves are reduced in air-compressor operation. The New STANOILS separate readily from water—no troublesome emulsions in compressor crankcases.



In Reduction Gears. Because of STANOIL's resistance to acidity and to deposit formation, gear cases of reduction gears remain clean. The oil may be used for longer periods with no danger of excessive wear of gears and bearings.

STANDARD

STANDARD OIL COMPANY (INDIANA)

YOUR PROCUREMENT JOB

IS SIMPLIFIED BECAUSE—

All these P-K Screws are Standard

With screws in limited supply, you have a better chance of improved delivery when you order *standard* types and sizes than when you order specials.

For this reason, the *complete* line of Parker-Kalon Self-tapping Screws is a definite advantage. In changing to a standard screw, you are not restricted to one or two types only remotely suited to your assembly needs. In the P-K* line, you have a choice of 5 distinct standard types, each designed for a special purpose. Chances are your assembly can be adapted to some one of these types with a minimum of redesign.

P-K Assembly Engineers will help you in every way possible to adjust your assemblies to limited supplies, and apply the long experience of Parker-Kalon to your most difficult problems of planning and procurement. Parker-Kalon Corporation, 200 Varick Street, New York 14, N. Y. Sold through Accredited Distributors.

TYPE A— the original Sheet Metal Screw, for light gauge sheet metal. **TYPE Z**— a thread-forming screw for light and heavy gauge sheet metal, non-ferrous castings, plastics, etc. Also made with **HEX HEAD**, suitable in heavier sizes for structural steel. **TYPE F**— cuts standard machine screw thread as it is driven. For ferrous and non-ferrous castings, light and heavy sheet metal, plastics, etc. **TYPE U**— Drive Screw for making permanent fastenings to ferrous and non-ferrous castings, plastics, etc.

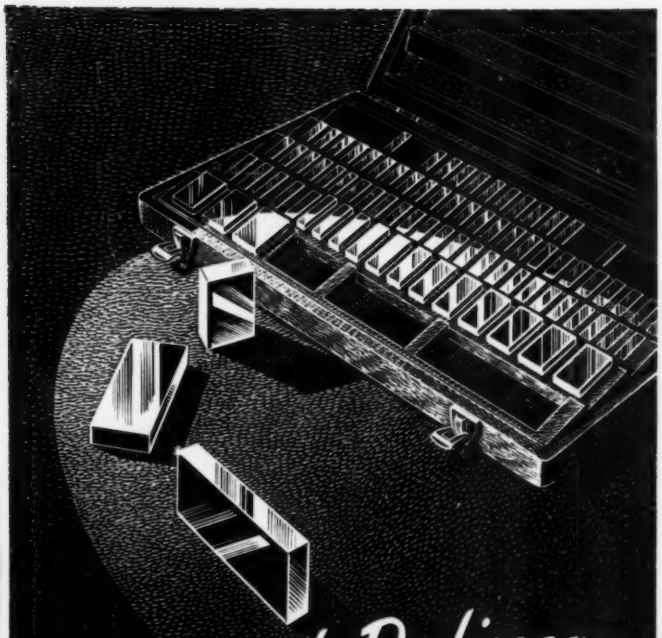
*TRADE MARKS REG. U.S. PAT. OFF.

IF IT'S P-K IT'S O.K.

The Original

PARKER-KALON* SELF-TAPPING SCREWS

A TYPE AND SIZE FOR EVERY METAL AND PLASTIC ASSEMBLY



Prompt Delivery

H. D. BLOCKS and FIXTURES

For years Webber has dedicated itself to the production of gage blocks at a price that even the smallest shop can afford.

Quality and precision have not been compromised in this undertaking. Ask those who use them. Write for literature.

STANDARD STEEL BLOCKS

CARBLOX CARBIDE

ANGLE BLOCKS

Webber

GAGE COMPANY

12901 TRISKETT ROAD

CLEVELAND 11, OHIO

LARGEST EXCLUSIVE MANUFACTURER OF PRECISION GAGE BLOCKS

CALL FOR A MIDGET INSTEAD OF A MAN

Wherever, Whenever You Need A Lift

MIGHTY-MIDGET PULLER . . .

Easily lifts and shifts heavy tool dies and castings, loads and unloads trucks, is equally efficient on horizontal as well as vertical pulls.

"Hey, Bill, give us a hand". . . and a skilled man leaves important production work to struggle with some non-routine lifting job. This practice is costly, dangerous and *unnecessary*. The Coffing Mighty-Midget Puller can be carried anywhere—weighs only 6½ lbs. — hooked anywhere — needs only 8½-in. headroom — handles odd jobs throughout the plant quickly, safely Lifts as much as three or four men . . . holds loads securely in any position. Capacity, 500 lbs.— factory-tested at 50% overload. Handle is either lever or high-speed crank.

Keep several of these light, handy tools in your plant. Let them help eliminate production interruptions by providing a safe, sure lift—anywhere. Write for Bulletin AM2MP.

LOW PRICE! — $21.75
(1000-lb. Model Only $31.00)

COFFING HOIST COMPANY

DANVILLE, ILLINOIS

Quik-Lift Electric Hoists • Hoist-Alls • Safety-Pull Ratchet Lever Hoists • Spur-Geared Hoists • Differential Chain Hoists • Load Binders • I-Beam Trolleys

What's good for the complexion of tin?

...*a brush!* Here's how to make tin plate keep its "steel mill complexion":

To produce and preserve high-quality finish of tin sheets calls for thorough cleaning prior to plating. Otherwise surface imperfections result during plating and costly work must be scrapped.

To clean the sheet, all traces of foreign matter are removed automatically at 1500 feet per minute with Osborn power brushing. Although operating under hot, high-pressure sprays, the Osborn brushes operate around-the-clock, assuring uninterrupted production and highest quality.

Find out how Osborn's improved brushing techniques can help *you* on product finishing and cleaning problems. A survey by your **O**sborn **B**rushing **A**nalyst will demonstrate what power brushing can do. Simply write for an **OBA.** *The Osborn Manufacturing Company, Dept. 417, 5401 Hamilton Avenue, Cleveland 14, Ohio.*

OSBORN

LOOK FOR THE NAME OSBORN . . . RECOGNIZED EVERYWHERE FOR QUALITY WORKMANSHIP AND MATERIALS

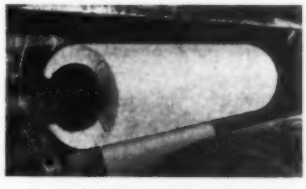
Cleans strip continuously at 1500 feet per minute with Osborn Power Brushing

OSBORN power brushing is being used widely by industry on many diversified applications of cleaning or finishing metallic and non-metallic parts. On the work shown below, Osborn power brushing mechanically cleans strip steel prior to electrolytic tin plating.

Continuous sheet scrubbing line at a leading rolling mill.

The continuous sheet scrubbing line in this rolling mill is a vital link in its over-all operation. Any interruptions become extremely costly since they tie up other lines, disrupt production schedules and lose precious man-hours.

Thorough cleaning of the sheet steel prior to tin plating is an absolute necessity. The slightest trace of rolling oil or dirt causes surface blemishes and porosity in the tin coating.



One of six Osborn Heli-Master Brushes used with hot, high-pressure spray.

For continuous, dependable performance at this mill, six Osborn Heli-Master* Brushes perform their mechanical scrubbing job efficiently, day in and day out, and at low end-of-service cost.

To insure maximum production efficiency on your continuous strip cleaning, sheet scrubbing, scale removing, conveyor cleaning and product finishing operations, consult your **O**sborn **B**rushing **A**nalyst. There's no obligation.

*Trademark

New!

SERIES

50

GENERAL PURPOSE MARKING MACHINES

for

- ✓ Marking round surfaces
- ✓ Marking flat surfaces
- ✓ Precision graduating
- ✓ Serial numbering
- ✓ Knurling and embossing

ROLL-O-MARK All-pneumatic (Model 50P1) marks up to 1200 pieces per hour

Here is the leader in the all-new Noblewest Series 50 marking machines. The *Roll-O-Mark*—with all-pneumatic operation—marks with greater speed and economy than any other medium priced general purpose marking machine. It employs the original Noblewest *roll-marking* process—producing sharp permanent impressions that will last the lifetime of the piece. Ideally suited for trade marking, part or patent numbering, codifying and serial numbering. Series 50 is also available in semi-pneumatic and manually operated models. Write today for catalog containing full information and specifications. Better still, tell us your specific requirements and we can make complete recommendations. The Noble & Westbrook Manufacturing Co., 17 Westbrook Street, East Hartford 8, Conn.

MARK IT BEST WITH NOBLEWEST

NOBLEWEST IMPROVED MARKING DEVICES

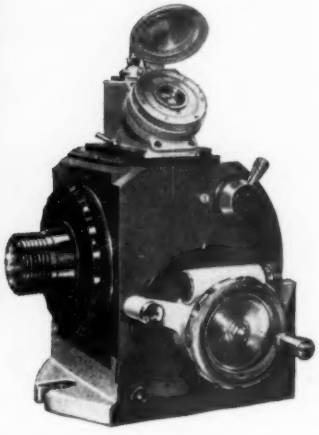
NOBLEWEST

EQUIPMENT FOR MARKING · GRADUATING · EMBOSSING · NUMBERING

INDEXING

Precision

INDEPENDENT OF BACKLASH, OIL FILM OR MECHANICAL WEAR



When you index work on machine tools with an OPL Dividing Head, the sources of error inherent in mechanical indexing are eliminated.

Not only is great precision possible, but the simplicity of visual indexing permits fast operation. You read direct from a clear scale, greatly magnified. No charts or interpolations are required. The chance of human error is minimized.

WRITE FOR OPL CATALOG

F. T. GRISWOLD MFG. CO.
WAYNE, PA., U.S.A.

Griswold

OPTICAL POSITIONING

"no more GAMBLING on tool steel selection"

[½ actual size; Selector is in 3 colors]

Since the first announcement, hundreds of tool steel users have received their CRUCIBLE TOOL STEEL SELECTORS. The comments received indicate that this handy method of *picking the right tool steel right from the start* is going over big.

"Handiest selector I've ever seen"

"No more gambling on tool steel selection"

"You're right, the application should dictate the choice of the tool steel" . . . and many, many more favorable comments.

You'll want your CRUCIBLE TOOL STEEL SELECTOR. It uses the only logical method of tool steel selection—begin with the application to pick the right steel! And the answer you get with one turn of the Selector dial will prove satisfactory in every case, for the CRUCIBLE TOOL STEEL SELECTOR covers 22 tool steels which fit 98% of all Tool Steel applications. ALL the tool steels on the Selector are in Warehouse Stock . . . that means when you get the answer, you can get the steel . . . fast!

Write for your Selector today! We want you to have it, because we know you've never seen anything that approaches your tool steel problems so simply and logically. Just fill out the coupon and mail. Act now! CRUCIBLE STEEL COMPANY OF AMERICA, Chrysler Building, New York 17, N. Y.

Here's how it works:

To use the Selector, all you need know is the characteristics that come with the job: type and condition of material to be worked, the number of pieces to be produced, the method of working, and the condition of the equipment to be used.

FOUR STEPS—and you've got the right answer!

1. Move arrow to major class covering application
2. Select sub-group which best fits application
3. Note major tool characteristics (under arrow) and other characteristics in cut-outs for each grade in sub-group
4. Select tool steel indicated

That's all there is to it!

Here's an example:

Application—Deep drawing die for steel

Major Class—Metal Forming—Cold

Sub-Group—Special Purpose

Tool Characteristics—Wear Resistance

Tool Steel—Airdi 150

One turn of the dial does it!

And you're sure you're right!!

Crucible Steel Company of America
Dept. A, Chrysler Building
New York 17, N. Y.

Gentlemen:

Sure! I want my CRUCIBLE TOOL STEEL SELECTOR!

Name_____ Title_____

Company_____

Street_____

City_____ State_____

CRUCIBLE first name in special purpose steels

TOOL STEELS

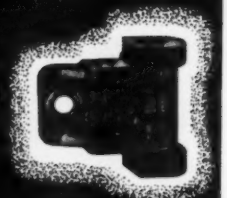
fifty years of Fine steelmaking

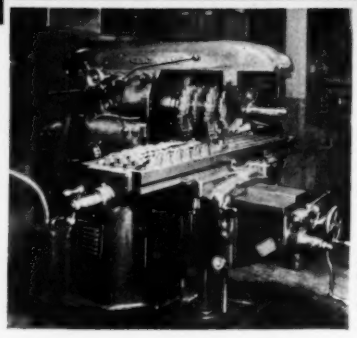
Branch Offices and Warehouses: ATLANTA • BALTIMORE • BOSTON • BUFFALO • CHARLOTTE • CHICAGO • CINCINNATI • CLEVELAND • DENVER • DETROIT HOUSTON, TEXAS • INDIANAPOLIS • LOS ANGELES • MILWAUKEE • NEWARK • NEW HAVEN • NEW YORK • PHILADELPHIA • PITTSBURGH • PROVIDENCE ROCKFORD • SAN FRANCISCO • SEATTLE • SPRINGFIELD, MASS. • ST. LOUIS • SYRACUSE • TORONTO, ONT. • WASHINGTON, D. C.

Here's how **NELCO** *Carbide Tipped Tools*

increased Production on this Chilled Iron Casting

OVER 60%!





Facing 4 surfaces of Chilled Iron Refrigerator Door Hinge on #3 Cincinnati milling machine — High Speed Steel Cutter vs. Nelco Carbide Cutter.

HIGH SPEED STEEL

Production — 50 pieces per hour.

Cutters needed frequent repairs.

Down-time increased production cost.

Rejected pieces were excessive due to chilled condition and hard spots in castings.

NELCO CARBIDE CUTTER

Production — 80 pieces per hour.

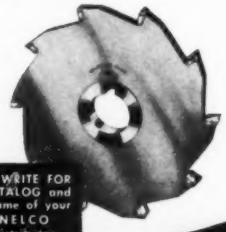
Resulted in continuous operating time and no rejected pieces.

Production increased *more than* 60%!

OBJECT: *SAVINGS—When you change to Carbide Tipped Tools!*

Chilled Iron, Steel, Brass, Bronze, Aluminum, or Alloys can be milled faster, better, more efficiently with Carbide Tipped Tools. There is a NELCO Cutter, Face Mill, Slab Mill to increase your production — cut your costs.

Remember: NELCO Tools are designed with nickel shim brazed carbide tips and alloy steel bodies. Investigate the many other NELCO exclusive advantages. Learn how your production costs can come tumbling down.



WRITE FOR CATALOG and name of your NELCO distributor.

NELCO TOOLS *For that Extra Edge in Production*

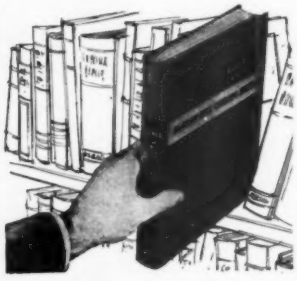
NELCO TOOL CO., INC. MANCHESTER, CONNECTICUT

From the *American Machinist* Library of *Tips for Top Shop Men*

IF you have worked with your hands, your normal tendency in a crisis will be to work with your hands again. There are times when this will impress the men who work for you, do much to knock down any idea that you're an incompetent stuffed shirt. But never forget that you're paid now for working with your head, and that headwork demands more perspective than handwork is likely to give you. Also remember the thrill you got out of achievement and give the next generation the same chance to grow.

Consult . . .

McGRAW-HILL Pre-Filed ELECTRICAL CATALOGS



when the need for an electrical product arises in your plant.

This compilation of manufacturers' catalog data will save time and provide the answers to such questions as:

Who makes a particular product?
(Directory Section)

What company makes the product best suited to my needs?
(Catalog Pages)

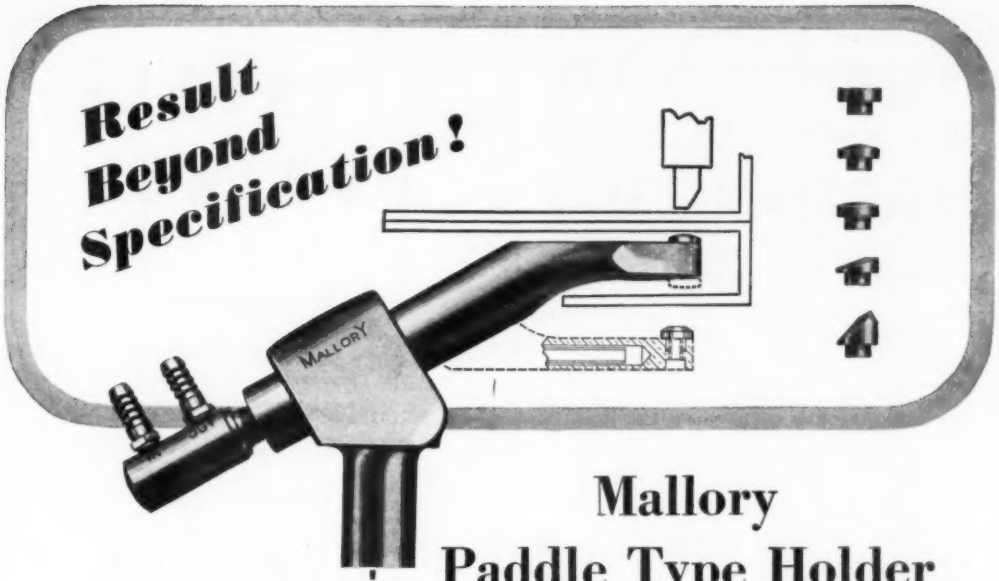
What sizes or capacities are standard?
(Catalog Pages)

What are the products' outstanding sales features?
(Catalog Pages)

Where is the nearest sales office or representatives?
(Catalog Pages)

If the Pre-Filed ELECTRICAL CATALOGS are not available for buying reference at your plant, write to:

McGRAW-HILL CATALOG SERVICE
330 W. 42nd St., New York, N. Y.
There is no charge to qualified users.



Mallory Paddle Type Holder

Speeds Welding In Limited Spaces

Typical of the time- and money-saving results of Mallory research and development in the resistance welding field is the Mallory Paddle Type Holder.

Water cooled and easily adjustable in amount of offset, it features replaceable tips that can be used on either face of the rotatable barrel. Its heavy duty construction enables it to be used on high pressure, hard-to-reach spots. Utilizing a wide range of standard button-type tips, the Mallory Paddle Type Holder requires a minimum clearance of only $^{23}/_{32}$" . . . speeds up operations in a great variety of once-difficult jobs . . . lowers production costs.

That's result beyond specification!

Mallory resistance welding know-how is at your disposal. What Mallory has done for others can be done for you!

In Canada, made and sold by Johnson Matthey and Mallory, Ltd., 110 Industry St., Toronto 15, Ontario

MALLORY HOLDERS

Mallory Holders are designed in a wide range of sizes and types, available in three groups—light—standard—and heavy duty—to cover a wide range of operating pressures. Each type of Mallory holder is designed for a specific type of work and a variety of sizes are carried in each type. The full range of Mallory holders allows quick changeovers in your shop and eliminates the need for expensive specials.

Resistance Welding Tips, Holders, Dies, Rod and Bars, Castings, Forgings

P. R. MALLORY & CO. Inc.
MALLORY
P. R. MALLORY & CO., Inc., INDIANAPOLIS 6, INDIANA

SERVING INDUSTRY WITH

Electromechanical Products
Resistors *Switches*
TV Tuners *Vibrators*

Electrochemical Products
Capacitors *Rectifiers*
Mercury Dry Batteries

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Contacts *Special Metals*
Welding Materials

Amazing NEW
Steel Hardening Compound
HARD-N-TUFF

Gives Mild Steels the Properties of High Grade
Increases the life of tools at least 300%

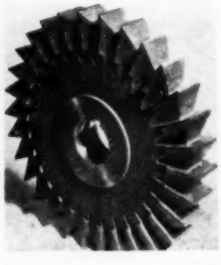
Any plant, Large or Small, can use it without special equipment . . .

HARD-N-TUFF will solve your war steel shortages and priority problems. With HARD-N-TUFF you can use CHEAPER steels and get fine steel performance. Keep drills, cutters, chisels, tools sharper, longer. Keep machines operating longer, faster. Cut machine shut-downs for cutting edge replacements to an unbelievable minimum. Used successfully on all types of tools, parts, dies and other low carbon or high speed materials.

In simple powder form, HARD-N-TUFF is extremely easy to use. Merely heat surface to be hardened, dip or roll in HARD-N-TUFF, reheat and quench. Entire operation only a few minutes. Tested on 1020 carbon steel, produces minimum hardness of 60 Rockwell. HARD-N-TUFF is the *only* CERTIFIED steel hardening compound on the market.

Three holes, each the size of the core of the bolt (minus threads), were drilled in ½" steel plate. The lag bolt was hardened with HARD-N-TUFF and forced through each hole with 12" wrench. Threads cut by lag bolt were uniform and reusable. Bolt threads were undamaged.

Chisel formed from ordinary wagon bolt. HARD-N-TUFF treated. Cut 1" deep into this ⅛" angle iron with 4 strokes of 3 lb. hammer. Chisel still razor-edged. No redressing.



Feather chopping machine knife formerly made of tool steel. This one is 1020 mild steel used as substitute by hardening with HARD-N-TUFF. Man hours saved and costs cut by using cheaper steel and hardening to 64 Rockwell.

Milling cutter, of ordinary carbon steel. Gave unsatisfactory service at normal speed, for cutting steel. Machine had to be slowed to 25% of normal. When hardened with HARD-N-TUFF, machine was stepped up to normal and loss eliminated.

DOUGHTY

HARD-N-TUFF

Packed in 3, 5 and 10 lb. cans at $8.75 per lb.
25, 50 and 100 lb. drums at special discount.

DOUGHTY LABORATORIES, INC.

299 MADISON AVENUE **NEW YORK 17, N. Y.**

DISASTER CONTROL

GAS MASKS

RESPIRATORS

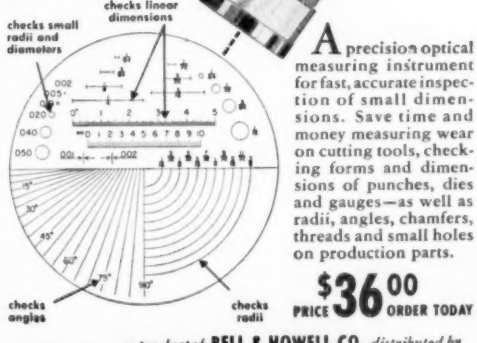
INDUSTRIAL SAFETY PROTECTIVE PRODUCTS

PULMOSAN
SAFETY EQUIPMENT CORP.

644 Pacific St., Brooklyn 17, N. Y.
1831 Franklin Ave., St. Louis, Mo.

new
POCKET COMPARATOR
(pat. applied for)

Saves time and money inspecting small dimensions



A precision optical measuring instrument for fast, accurate inspection of small dimensions. Save time and money measuring wear on cutting tools, checking forms and dimensions of punches, dies and gauges—as well as radii, angles, chamfers, threads and small holes on production parts.

PRICE $36.00 ORDER TODAY

a product of **BELL & HOWELL CO.** *distributed by*

Write for FREE descriptive folder

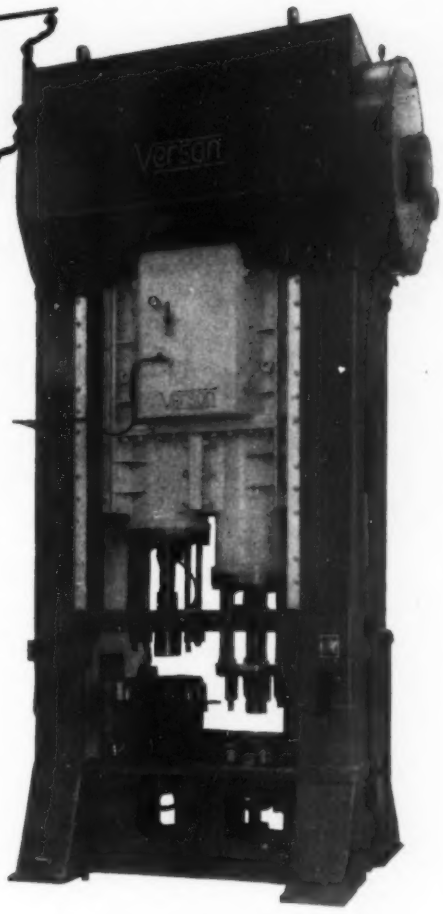
See Your National Tool Co. Representative or Local Jobber

NATIONAL TOOL CO.

11205 Madison Avenue Cleveland 2, Ohio

Can you match these production figures?

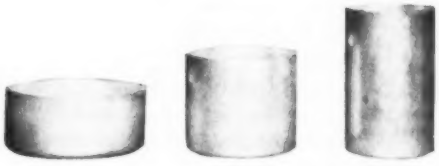
THIS Verson AUTOMATIC TWO STAGE THREE OPERATION DRAWING PRESS produces over 1200 shells per hour



Typical of how Verson presses are advancing the efficiency of press forming of metals is the automatic two stage three operation drawing press illustrated above. 4½" I.D. x 7¼" deep shells are drawn at the rate of 1200 per hour! A completed shell is discharged at each stroke.

Presses such as this are typical of the many unusual machines being produced by Verson. But whether your job is unusual or conventional, it will be of interest to you to learn how Verson's extensive experience and know-how as a manufacturer of better presses for most jobs can help you.

Whatever your press requirements, whether they call for a single machine or a complete tool-up, call on Verson.



At the right is the finished shell after the final drawing and setting operation. Drawn from 21 ga. stock, the dimensions are 4½" I.D. x 7¼" deep.

Originators and Pioneers of Allsteel Stamping Press Construction

VERSON ALLSTEEL PRESS COMPANY

9316 South Kenwood Avenue, Chicago 19, Illinois — Holmes Street and Ledbetter Drive, Dallas 8, Texas

A VERSON PRESS FOR EVERY JOB FROM 60 TONS UP!

MECHANICAL AND HYDRAULIC PRESSES AND PRESS BRAKES • TRANSMAT PRESSES • TOOLING
DIE CUSHIONS • COMPRESSION AND TRANSFER MOLDING PRESSES

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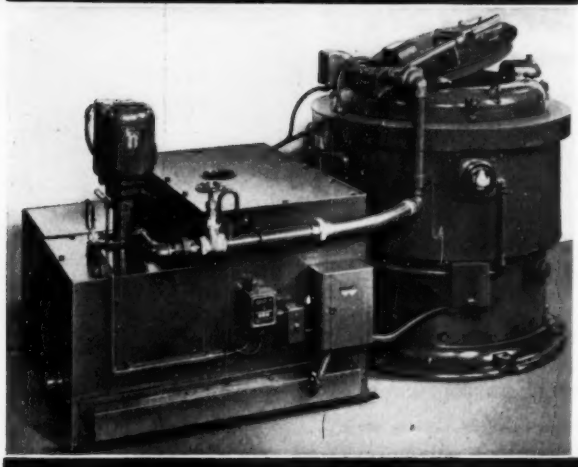

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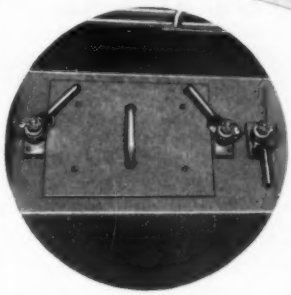

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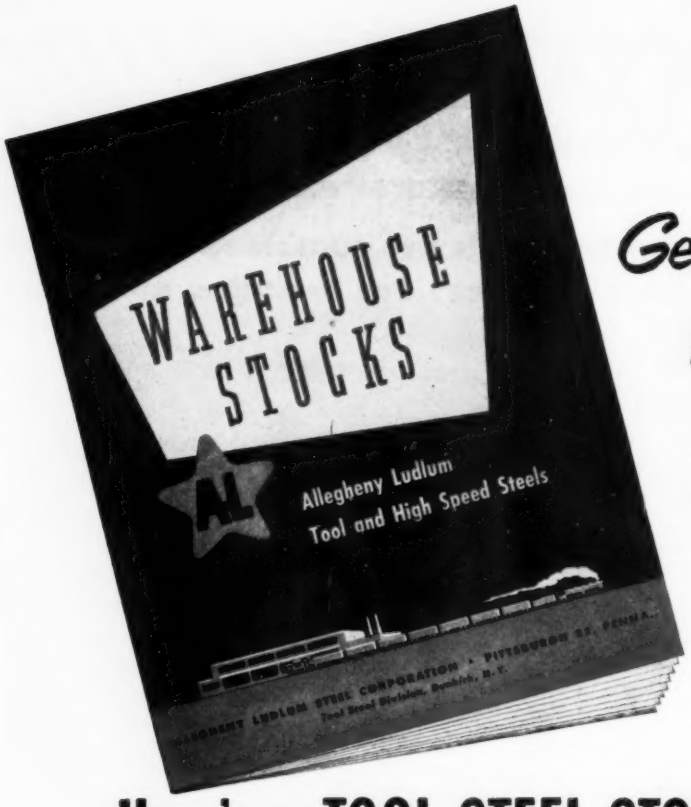

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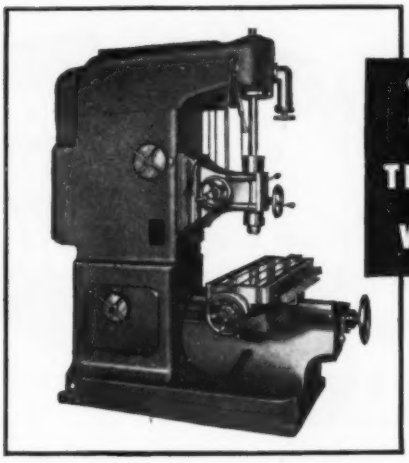

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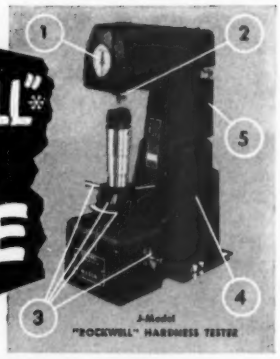

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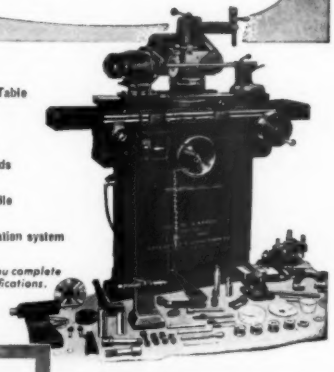

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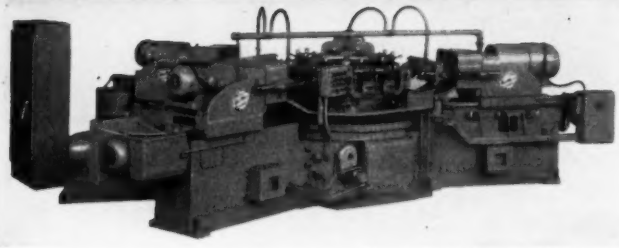

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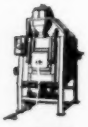

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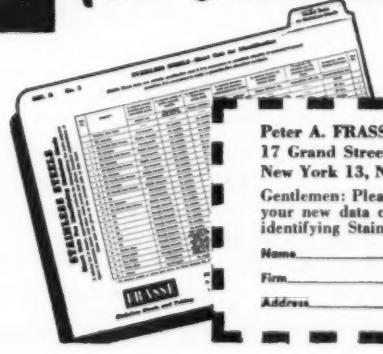

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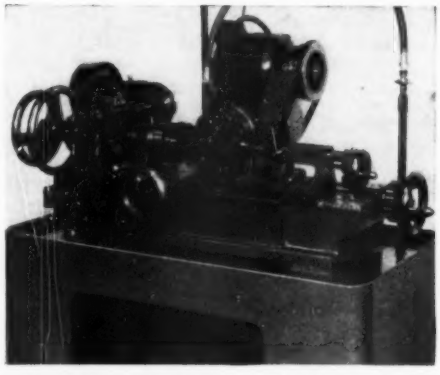

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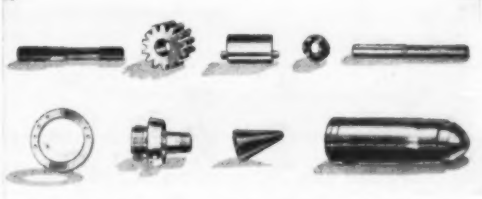

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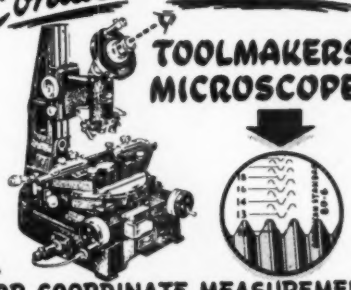

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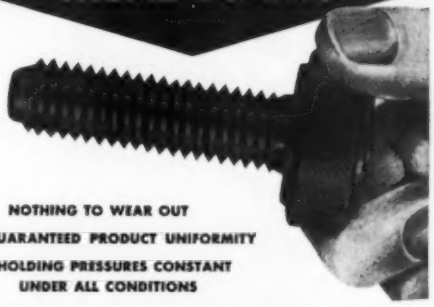

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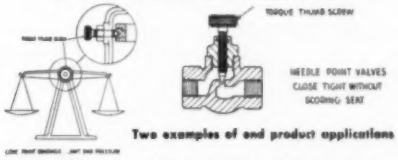

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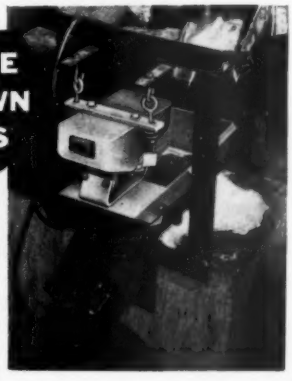

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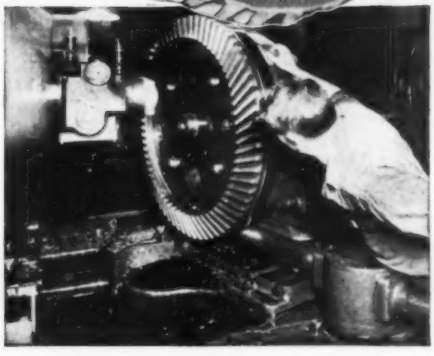

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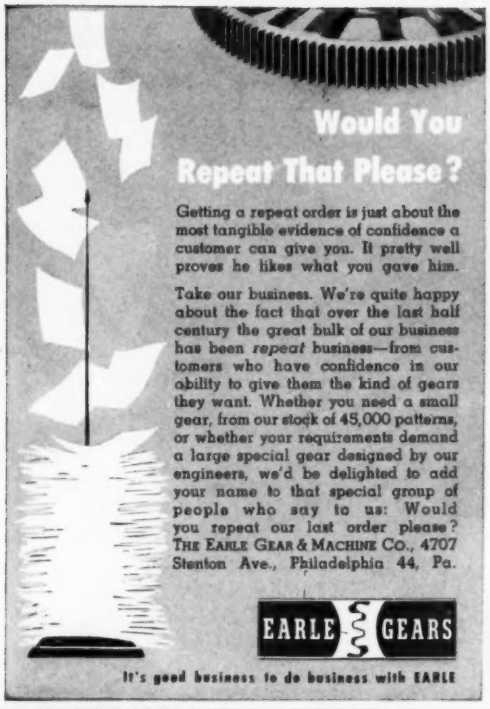

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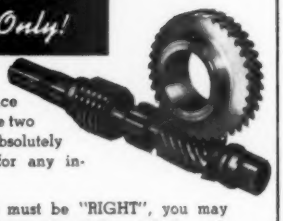

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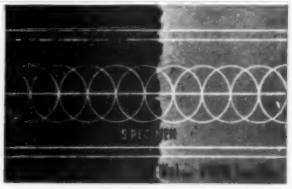

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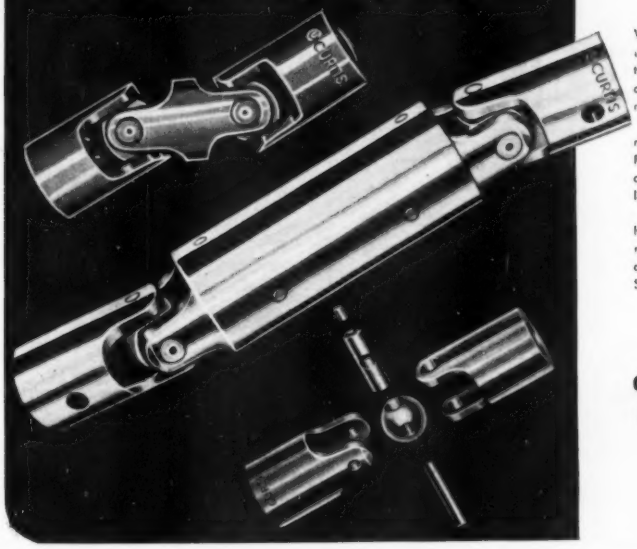

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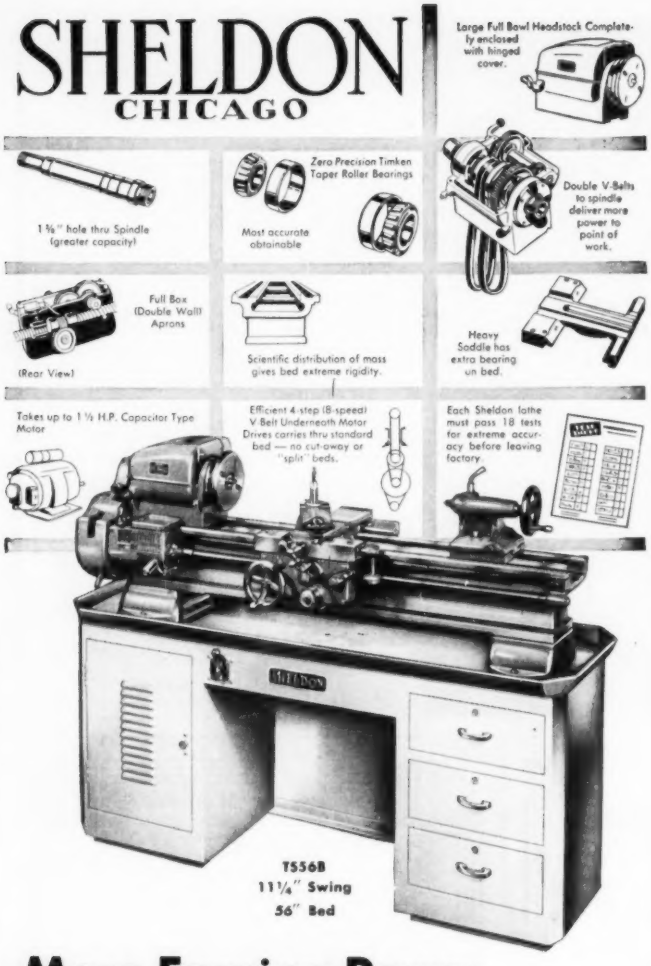
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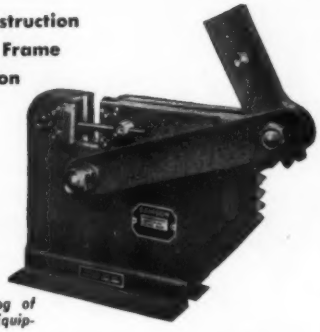

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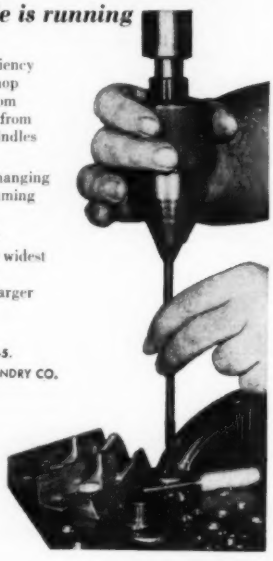

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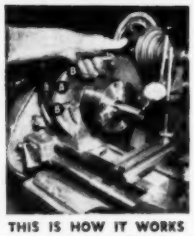

THIS IS HOW IT WORKS
Pinion "A" moves jaws in or out to grip work like any scroll chuck. 4 opposed screws "B" (only 2 shown) bring work to dead center. It's as easy as it sounds. Inexperienced men can center work within .0005 in 3 minutes! Once set dead true, you can machine hundreds of duplicate parts without changing adjustment!

1. .0005 precision with scroll chuck rechucking speed.
2. Handle collet and step-collet work.
3. End most stub arbor, mandrel needs.
4. Adapt to dividing heads, grinders, screw machines, lathes.
5. Minimum overhang—grips work closer to spindle for greater accuracy.

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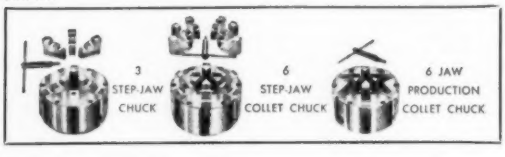

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210 Schippers Lane
Kalamazoo, Mich.

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The 1947 U.S. Government Census reports 44,923 metalworking plants in the following categories:

Manufacturers of Fabricated Metal Products	16,734
Machinery (except electrical)	17,906
Electrical Machinery	3,973
Transportation Equipment	3,711
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In 1947, these plants employed 4,731,820 people . . . industry's largest labor force. Of these people, 4,321,684 worked for the 10,151 plants that employ 50 or more workers each.

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American Machinist

The McGraw-Hill Magazine of Metalworking Production

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BLAKE TAP SHARPENING EQUIPMENT DOES THIS FOR OTHERS

No. 4 in a continuing study of Tap performance records made by users of Blake Tap Sharpening Equipment.

TAP PERFORMANCE

Before Sharpening Tapping to Class #3 fit a 7/16—27 L.H. thread in brass 3/16" deep blind hole. Operation performed on automatic screw machine with average standard 3 flute commercial Grd. tap. No. of holes: 3000

After Sharpening on Blake Equipment Tap reground with plus 5° hook in flutes increases average holes *per grind* to 18,000—an increase of over 600% *per grind*. Average six grinds per tap before it is discarded as too small or too short in thread length. Total holes per tap—108,000.

Why Not You!

To get dollar-for-dollar value from your taps, you *must* sharpen them just as you do other cutting tools. The Blake Flute Grinder and the Blake Chamfer Grinder provide you with fast, accurate, and economical means for grinding straight flutes, spiral points, and the chamfered ends of your taps — a sure means of reducing your tap bill. Investigate today.

Ask for Bulletins 549 and 649

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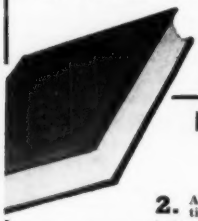

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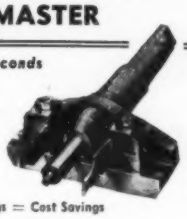

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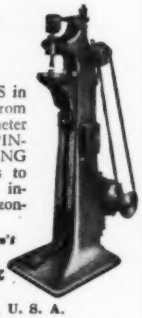

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for heavy blanking and forming

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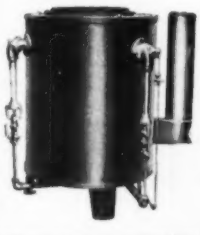

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It will show where improved transportation and shipping facilities are needed . . . better harbors and waterways . . . stepped-up Public Service.

That is why the 1950 United States Census is vital to your business!

COOPERATION

You know that the Census-Taker is not just "counting heads." He's actually making a survey of existing conditions in industry, business, employment, housing, education. *You* know census information is as confidential as the vote you cast! Because you know all these things *you'll* cooperate with the Census-Taker in every way when he calls on you.

WHAT ABOUT THE OTHER FELLOW?

But! What about the people who work for you? The man in the shop . . . your own secretary . . . the fellows in the shipping room. Do they know all this about the Census? Chances are some of them do, so the idea is to get the right information across to those who don't!

WHAT'S THE BEST WAY?

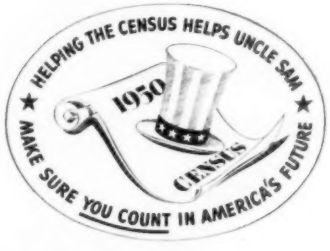
If it's possible, call everyone together and talk about it . . . ask questions . . . exchange ideas. If your outfit is too big for that, direct a Census information memorandum to all your employees. Post information on the bulletin boards. Run a Census story in the company house organ. Talk about it. *Every way you can . . . get the people who work for you to cooperate with the Census.*

WHAT DOES THE 1950 CENSUS MEAN TO YOUR EMPLOYEES?

Better schools . . . school buses . . . school lunches. It means finer roads, bridges and highways . . . increased transportation facilities . . . improved safety regulations. It creates more efficient Public Service and furthers adequate distribution of utility services such as telephones, gas, water and electric power. It will help your community plan better parks, playgrounds, recreation areas and housing. It will mean higher living standards and accurate congressional representation. The Census is *everybody's voice in America's future!*

YOU OWE IT TO YOURSELF...

Mister Businessman . . . to your business and your community! Put your efforts behind the 1950 United States Census for an even better country to live in . . . the *best* country to do business in!



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Also Steel Sheets, Strip Steel Coils
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Horizontal Boring Mill

3" to 4" cap. with a travel in height of 50" or more, and a cross travel for the table of 6 ft. or more. A floor type Mill with the same specifications will also be suitable. State mfgrs name, age, serial no., and best cash price.

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No. 1½, 2, 3 Cincinnati, cone
No. 2 Cincinnati H.S. Dial, m.d., latest
No. 2 Cincinnati Plain H.P., belted m.d.
No. 2 Rockford, m.d.
No. 2G LeBlond, belted m.d.
No. 2M Cincinnati, m.d. in base
No. 3B Brown & Sharpe High Speed, m.d., late
No. 3 Cincinnati H.P., m.d., p.r.t., late type
No. 3, 4 Kempsmith Maxi-Miller, m.d.
No. 3B Milwaukee, m.d.
No. 3 Van Norman Duplex, s.p.d.
No. 4 Cincinnati H.P., m.d.
No. 4 Ohio, cone
No. 5 Cincinnati, rect. overarm, m.d.
No. 5 H.D. LeBlond, s.p.d.
No. 5B Brown & Sharpe Heavy, m.d.

UNIVERSAL MILLING MACHINES

No. 1AD Brown & Sharpe, m.d.
No. 2A Brown & Sharpe, s.p.d.
No. 2 Kempsmith, cone, motorized
No. 3 Kempsmith, cone
No. 3A Brown & Sharpe, s.p.d.
No. 4A Brown & Sharpe, m.d.
No. 4 Cincinnati H.P., m.d.
No. 4G LeBlond, s.p.d.

VERTICAL MILLING MACHINES

No. 0B Cincinnati, m.d., latest
No. 2M Cincinnati, m.d.
No. 3, 4 Cincinnati H.P., m.d.
No. 2, 3 Cincinnati High Speed Dial, m.d., latest
No. 2 Cincinnati Medium Speed Dial, m.d., latest
No. 2K, 3K Milwaukee Dial, m.d., latest
No. 2½B, 3B Milwaukee, m.d.
No. 3V Toledo, s.p.d.
No. 3V Van Norman, m.d., latest
No. 5 Brown & Sharpe, cone
No. 6 Becker, cone
Cincinnati Hydromatic, m.d., 2 spindles

MANUFACTURING TYPE MILLING MACHINES

No. 0 Sundstrand Rigidmill, m.d.
No. 00 Sundstrand Rigidmill, m.d.
No. 12 Brown & Sharpe, m.d.
No. 1-12 Cincinnati, m.d., latest
No. 2-24 Cincinnati, m.d., latest
3A Sundstrand Copy Rigidmill, m.d.
No. 4-48 Cincinnati Plain Hydromatic, m.d., latest
48" Cincinnati Automatic Duplex, m.d.
M30 Milwaukee Simplex, m.d., latest
No. 34-30 Cincinnati Duplex Hydromatic, m.d., with tracer control, latest
No. 34-36 Cincinnati Plain Hydromatic, m.d., with tracer control, latest
No. 34-60 Cincinnati Plain Hydromatic, m.d., latest
No. 56-72 Cincinnati Duplex Hydromatic, m.d., latest
No. 56-90 Cincinnati Duplex Hydromatic, m.d., latest
Type P Ohio Mfg., m.d.
Sundstrand Rigidmill, m.d.
4" Pratt & Whitney Spline, m.d.
No. 33 Kempsmith, s.p.d.
18", 24" Cincinnati Plain Automatic, m.d.
24" Cincinnati Duplex Automatic, m.d.
30"x36"x12" Ingersoll Slab Milling Machine, 2 head, m.d.
48"x48"x20' Ingersoll Fixed Rail Milling Machine, for tank work

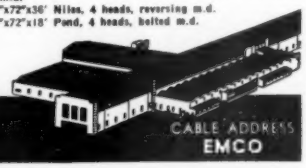
MILLING MACHINE ATTACHMENTS

16" Cincinnati Circular Milling Table, p.f.
Kearney & Trecker Attachment for Milling Bridge Reamers, 62" long & 24" wide
1¼" Cincinnati Rack Milling Attachment for No. 3 Dial Type Miller
Rack Milling Attachment for No. 5 Cincinnati H.P. Miller
Cincinnati Universal Spiral Milling Attach. for No. 2 Dial Type Miller
16" Kearney & Trecker Rotary Table, p.f.
36" Cincinnati Power Feed Rotary Table, m.d. for Vertical HydroTel
Cincinnati Universal Vertical Attachment for No. 5 Miller.

PLANERS

P10 Coulter Crank Type Shaper-Planer, 1 head, m.d.
20"x20"x5' Whitcomb-Blaisdell Planer, belted m.d., 1 head
24"x24"x5' G. A. Gray, belted m.d., 1 head on cross rail
30"x30"x10' Cincinnati, belted m.d., 2 heads
36"x36"x8' Gray, belt
36"x36"x10' Cincinnati, belted m.d., 2 heads
36"x36"x10' Niles, 2 heads, belt
36"x36"x16' Cincinnati Hypro D.H., v.v.d., 2 heads on rail & 2 side heads, latest
36"x36"x16' G. A. Gray, reversing m.d.
36"x36"x18' Niles-Bement-Pond, 2 heads, reversing m.d.
36"x36"x20' Cincinnati, 2 heads, belt
36"x36"x20' Gray, 2 heads, belt
36"x36"x24' Cincinnati, belted m.d., 2 heads
36"x36"x20' Gray Spiral Drive, 2 heads, belt
42"x42"x20' Gray, 2 heads, belted m.d.
48"x48"x18' Detrick & Harvey, 4 heads, reversing m.d.
48"x48"x28' Cincinnati, 4 heads, reversing m.d.
48"x48"x30' Cincinnati, 4 heads, m.d.
48"x48"x32' Niles-Bement-Pond, 4 heads, reversing m.d.
62"x62"x40' Cincinnati, 4 heads, reversing m.d.
66"x60"x40' Niles-Bement-Pond, 4 heads, reversing m.d.
72"x72"x36' Niles, 4 heads, reversing m.d.
96"x72"x18' Pond, 4 heads, belted m.d.

WRITE FOR COMPLETE STOCK LIST



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No. 4 B & S Automatic, M.D.
Federal 100 KVA Welder, Model P-2.

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★ GRINDERS ★ PLANERS ★ HEADERS

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AUTOMATIC, B & S #2 Wire Feed. 1".
AUTOMATIC B & S #2G, 1".
BORING MILL, Niles B & P 120" Vert. 30 h.p.
BORING MILL, Colburn 60" Vert. Two Hds.
BORING MILL, Bullard 24" Vert. New Era Type.
BORING MILL, Gisholt 42" Vert. 220/440 volts.
BORING MILL, Lucas #31 Horiz. 3" Bar.
BORING MILL, Giddings & L #8 Horiz. 3" Bar.
BORING MILL, Giddings & L #32 Horiz. 3½" Bar.
BORING MILL, Ryerson #11 Horz. 3" Cap. #6 M.T.
BORING MILL, Barrett #2 Horiz. Cyl. Borer. 5"
BORING MILL, King 42" Three Head Vertical. A.C. Motor Dr. Power Rapid Traverse to each head.
BORING MILL, Bullard 54" Vert. Spiral Drive. Bommer & Adams #20A Boring, Hobbing & Threading Machine. Timken Bearings. Swings 36" over bed. 18" cross feed, 42" lenght. Carriage has rapid approach & return. Used to mill internal threads. Excellent Condition.
BORING MILL, Betts 78" Vert. Turning & Boring.
New in 1943. All Electricals.
BORING MILL, 61" Bullard MAXI-MILL. 2 Hds.
BORING MILL, #9 Giddings & Lewis, 3½" Bar. #5 M.T. 220/440 volts. TWO.
THREAD MILLER, Pratt & Whitney #1105. 6x14 cap. 220/440 volts.
THREAD MILLER, Hanson Whitney 4"x9" Univ. Semi-Automatic.
THREAD MILLER, Hanson Whitney 7½x11 Univ. Semi-Automatic.
THREAD MILLER, Lees Bradner #20 Automatic Threading. 220/440 v.
VERT. MILL, Linley High Speed Jig Borer & Miller. 8-speeds, 275 to 4430 r.p.m. w/indicators & measuring rods.
HONE, Barnes #307 Sgle. Spdle. Hydraulically Reciprocated Twin Cylinder Vertical Honing Machine. 220/440 motors.
DISC GRINDER, Besley #205—18" Dble. End Motor Driven. 220/440 volts. Wet or Dry.
HAMMER, Rivetting, High Speed, All Sizes, motor driven.
HAMMER, Bradley 200# Rubber Cushioned Helve, 225 to 240 blows per minute. Single pulley drive.
LATHES, TURRET, Bardons & Oliver #1 Electric Bar Feed. ¾" cap. Collets, Rd. Sq. Hx. 220 volts motor.
BOREMATIC, Heald #49 Sgle. End. W/Univ. Fixture. 220/440 volts.
BROACH, Oilgear 10 Tons Horiz. 56" Str.
BUFFER & POLISHER, U. S. Electrical Multi-speed Double End #93, 5 h.p., 220 volts.
SGLE. SPDLE. DRILL, Fosdick 16" Sldg. Hd. #2
SGLE. SPDLE. DRILL, Barnes 24". #4 M.T.
SGLE. SPDLE. DRILL, Barnes 20". #3 M.T.
SGLE, SPDLE, DRILL, Buffalo #2MS. 28" #3 M.T.
SGLE. SPDLE. DRILL, Aurora 36" Brdg. #5 M.T.
SGLE. SPDLE. DRILL, Colburn #2 Mfg. #4 M.T.
TWO SPDL. DRILL, Leland Gifford 20". #2 M.T.
TWO SPDLE. DRILL, Leland Gifford 20". #2 M.T.
TWO SPDLE. DRILL, Leland Gifford #2LMS 20". #2 M.T. 11" c.c.
DRILL, Avey-Matic #3 Hvy. 2-Spdl. #3 M.T. 24".
3—SPDLE, DRILL, Leland Gifford #2 MS—14". 11"
3—SPDLE. DRILL, Edlund #2B, #2 M.T. 16". 9½"
DRILL, L. Giffords #2MS 14". 11" C.C. 3-Spdle
4—SPDLE. DRILL, Leland Gifford 20". #2 M.T. 11"
4—SPDLE. DRILL, Demeo #KT. #2 M.T. 24"
6—SPDLE. DRILL, Leland Gifford 14". #2 M.T.
DRILL, Cincinnati 21" Brdg. Drilling & Tapping.
DRILL, Radial, Cinci-Bick. 5' Arm, 13" Col. #5 M.T. 24 speed gearbox. 7½ h.p. 3/60/220.
DRILL, Baker #314 Hvy. Pattern High Speed Vertical Boring & Drilling Machine, 7½ h.p. 220/440 motor, #5 taper, 12 feeds, 6 speeds, 12¼" throat, 3" Capacity in steel.

PARTIAL LISTING OF LARGEST STOCK IN THIS AREA

RADIAL DRILL, Fosdick 5' Arm, 14" Col. #5 M.T.
RADIAL DRILL, Mueller 3½' Arm, 11" Col. #4 M.T. 220/440 Volts.
RADIAL DRILL, Cinci-Bickford 4' Arm, 13" Col. #5 M.T. 220/440 volts.
RADIAL DRILL, Cinci-Bickford 6' Arm. 15" Col. #5 M.T. 220/440 volts.
RADIAL DRILL, Carlton 4'-15". Motor Dr.
DRILL, Natco #12 Multiple Spindle Motor Driven. #1 taper, 3 h.p. 220/440 motor. Arranged for 18 spindles. Rectangular head. With Natco 24" Rotary Table.
BASE PITCH & SPACE MEASURING MACHINE. #337 Illinois. Late Type—Like New. Capacity—12" diameter gear, 15" between centers. Full Set of OR-Set and Straight Contact Fingers, Dial Indicator, Tailstocks and Leatherette Cover.
SURFACE GRINDER, Horiz. Leach 6"x12" Hand.
SURFACE GRINDER, Horiz. Thompson 18"x6" Hydraulic. 1942.
GRINDER, Cylindrical, Brown & Sharpe #2 Universal. 220/440 motors.
GRINDER, Tool & Cutter, Sterling #F Universal. 220/440 motors.
GRINDER, Surface, Covel #7B Horiz. Hydraulic 6"x24".
GRINDER, Cam, Landis 5"x40" "Type D" Hydraulic Semi-Automatic. New in 1942. Slight use, like new.
GRINDER, Cylindrical, Norton 10"x24" Hydraulic.
GRINDER, Cylindrical, B & Sharpe #4 Univ.
GRINDER, Cylindrical, B & Sharpe #10. 6x18.
GRINDER, Cylindrical, Cinci. 6x18 Hydraulic.
THREAD GRINDER, J & Lamson #TG-615 Automatic. Late Type
GRINDER, Blanchard #16, 26" Chuck Vert Rotary.
GRINDER, Landis Crank 10x32 Hydraulic.
GRINDER, Brown & Sharpe #2 Auto. Horiz. Surface.
GRINDER, Cincinnati #EA, 18" x 36" Hydraulic Cylindrical, Filmatic Bearings, 220 volts motors. Built-in electrics, Hydraulic infeed.
GRINDER, Norton 6 x 18 Hydraulic Vert. Rotary Auto. Excello Spdle.
GRINDER, Norton 6 x 18 Hydraulic Horiz. Surface. Excello Spdl.
GRINDER, Pratt Whitney 22" Vert. Rotary. 84" table travel.
GRINDER, Greenfield #12 Internal Hydromatic. 220/440 V.
GRINDER, Heald #70 Internal.
GRINDER, Pratt Whitney 14x36 Vert. Rotary.
GEAR HOBBER, B & S #34 Spur. 18" dia.
GEAR SHAPER, Fellows #7 High Speed.
KEYSEATER, Mitts & Merrill #5 Giant Motor Driven., 220/440 volts motor, Capacity—24" long, 3" wide keyway, Automatic Feed.
LATHE, 32"x16' Briggeford Q.C.G. Grd. Hd.
LATHE, 20"x72" Sidney 'Mono-Trol'. Taper Att. Etc. 220 volts.
LATHE, 26"x18' Bridgeford Q.C.G. Grd. Hd.
LATHE, Bridgeford 20"x14' Q.C.G. 6'6" C.C. 220 volts two speed motor.
LATHE, 24"x8' Lodge Shipley, Hvy. Duty.
LATHE, 24"x14' LeBlond Q.C.G. Grd. Hd.
LATHE, 20"x10' American Q.C.G. 72" c.c.
LATHE, 20"x10' Hendey Q.C.G. Taper Att.
LATHE, Reed-Prentice 20"x60' Grd. Hd.
LATHE, 20"x8' Lodge & Shipley Q.C.G.
LATHE, 18"x8' Lodge Shipley Q.C.G. Gr. Hd.
LATHE, 16"x6' LeBlond Q.C.G. Taper Attach.
LATHE, 16"x6' Lodge Shipley Q.C.G. Grd. Hd.
LATHE, 14"x6' Hendey Q.C.G. Taper Attach.
LATHE, 14"x6' Hendey Q.C.G. Taper Attach.
LATHE, 12"x5' Hendey Q.C.G. Taper Attach.
LATHE, 10"x24" Logan #820 Q.C.G. NEW
LATHES, Turret #4 W & S Univ. 1½".
LATHES, Turret, #2 Simmons Grd. Hd. 1".
MILL, Van Norman #2SP Horiz. 220 volts.
MILL, Van Norman #3V Vertical Ram Type, 220/440 motors.
MILLING MACHINE, Vert. #3 Cinci. High Power.
MILLING Machines, Vert. #4 Cinci. High Power.
MILLING Machine, Horiz. #2, #3, #4, #5 High Power. 220/440 Motors.
MILLING Machine, Horiz. #3 Kempsmith Univer.
MILLING Machine, Horiz. #4 LeBlond Univ. Hvy.
MILLING Machine, Horiz. #1½ B & Sharpe Univ.
MILLING Machine, Horiz. #2 Kempsmith Univ.
MILLING Machine, Horiz. #2 B & Sharpe Univ.
MILLING Machine, Horiz. #3 B & Sharpe Univ.
MILLING Machine, Duplex, Cochrane-Bly #14 Univ.
Mill & Shaper, #9 Taper. Shaper—0" to 6" Stroke. Rotary Table. 220-440 volts.
MILLING Machine, Duplex, Van Norman #2.
MILLING Machine, Cincin. #4—36 Plain Hydmatic.
MILLING Machine, Prod. #1—18 Cinci. Hor. Auto.
MILLING Machine, Prod. #3—8 Cinci. Vertical.
MILLING Machine, Prod. #3—8 Cinci. Auto. Horiz.
MILLING Machine, Production, #12 B&S 18" Late Type (G).
MILLING Machine, Prod. #12 B&S 24" Late Type.
MILLING Machine, Horiz. K&T #2B Dble. Overarm. 220/440.
MILLING Machine, Horiz. K&T #3B Dble. Overarm. 220/440.
MILLING Machine, Horiz. Nichols Hand Millers, late type.
MILLING MACHINE, Cincinnati Vertical #3 H.S. Dial Type, W/Rotary Table.
MILLING MACHINE, U. S. #MMI-8 Cam Controlled Automatic Horizontal, #40 taper, Late Type, 220/440 motors. TWO.
THREAD MILLER, Pins-O-Mill #3 Planetary Form & Thread Semi-Automatic Milling Machine, #40 Spdl. Timken Bearing. THY-MO-TROL Control Unit. 5 h.p.
PIPE THREADER, Williams #3, 1½" to 6".
BOLT THREADER, Hill-Acme #1½-C Sgle. Hd.
TAPPER & THREADER, W & S #11R Dual Radial. Motor and Tooling.
TAPPER, W & S #1 Sgle. Spdle.
O.B.I. Press, Bliss #21B, 40 tons. 2½" Stroke.
POWER PRESS, Bliss #164 Open Back S.S.S.A. 65 tons, 4" Stroke.
POWER PRESS, Bliss #84 S.S.S.A. 35 tons, 10" Stroke, 20" between uprights.
POWER PRESS, Bliss #75½ S.S.S.A. 125 tons, 5½" Stroke, 24" between uprights.
POWER PRESS, Bliss #3A S.S. Dble. Crank S.A. Grd. 45 tons, 4" stroke, 36" between uprights.
POWER PRESS — Bliss - Consolidated #163 - B Straight Side Dble. Crank Single Action, 45 tons, 6" stroke, Bed area—24" x 41", 15 h.p. 220 motor.
PRESS, Federal #2 O.B.I. Grd. 2" Stro.
PRESS, Federal #2 O.B.I. 2" Stro.
PRESS, Federal #3 O.B.I. Grd. 4" Stro.
PRESS, Federal #4 O.B.I. Grd. 3" Stro.
GEAR SHAPER, Fellows #72 High Speed.
SHAPER, Vert., Pratt Whitney #B—6" Motor Dr.
SHAPER—Columbia 32" B.G. Crank.
SHEAR, Squaring, Wysong & Miles #572-A, 6'x 14 ga. All Gauges & 220/440 motor.
SHEAR, Morgan 120"x¾" Guillotine Plate, 36" Gap.
SHEAR, Quickwork #A-1 Rotary 60" Throat. 18 ga.
WELDER, Federal #712 AT Motor Driven Toggle Action Projection. New in 1936. 200 KVA, 10" throat. Stroke—1" to 3". With controls.
WELDER, Federal #824B Hvy. Duty Grd. Type 75 KVA. 1½" Stroke. 17" throat. Motor driven.

LATEST TYPES — GUARANTEED MACHINE TOOLS 1941-1950 MODELS

MILLING MACHINES
CINCINNATI: 2-sp Vert. Hydrotel, 2 rotary tables
CINCINNATI: #2M Vertical, Rotary table, P.F.
CINCINNATI: 9-S Vertical
SUNDSTRAND: #6 Rigidmil—Duplex (for milling cam tracks in propeller hubs or similar work)
SUNDSTRAND: #00 Rigidmill—Hydraulic
SUNDSTRAND: #6 Rigidmil
MOREY: 12M 2-spindle Profiler
TAYLOR-FENN: M-50A Vertical
TAYLOR-FENN: M-80 Duplex Spline
TAYLOR-FENN: Vertical 6"x21" Table, power feed
REED PRENTICE: #5 Vertical
RICE-BARTON: Duplex Spline
VAN NORMAN: 10CT Contour Miller
BECKER: #6 Vertical, m.d.

THREAD MILLERS & TAPPERS
MOREY: 12"x60" Thread Miller
LEES BRADNER: 40A Thread Miller
LEES BRADNER: LT 6x30" Thread Miller
HALL PLANETARY: B, C & D Thread Millers
MURCHEY: #22 Tapper, Horizontal
PRODUCTO: Hand Tapper 3 HP
NATCO: Vertical Tapper 18 spindle

TOOL SHARPENERS
OLIVER: 2A Face Mill Grinder
OLIVER: 510 Drill Sharpener
OLIVER: 10" Tool Bit Grinder Template Type
FELLOWS: Flat Top Helical Gear Cutter
RANSOM: 2-wheel grinder 3 HP
TAYLOR-FENN: 28" Tool Grinder

GRINDERS—THREAD
EXCELLO: #31 & #33 External
JONES & LAMSON: TG848 External
JONES & LAMSON: TG1248 External

GRINDERS—CYLINDRICAL
NORTON: 6"x18", & 10"x18", Plain
NORTON: 10"x18" 45° angle wheel head
LANDIS: 18"x18" "C" Plain Hydraulic
LANDIS: 18"x32" Type "D" Crankpin, Hydraulic
CINCINNATI: #2 Centerless
CINCINNATI: 6"x18" Hydraulic Filmatic
CINCINNATI: 10"x30" Filmatic
BROWN & SHARPE: #10 & #23 Plain

GRINDERS—INTERNAL
BRYANT: #5 and #5Y Internal
BRYANT: 18CIG Internal
HEALD: #35 Planetary
HEALD: 70A Plain Internal
HEALD: 72AS T-bed, Universal
HEALD: 72A3, 72AS Plain & Universal
HEALD: 72A3 Sizematic Centerless
HEALD: 173 Sizematic for Cylindrical Cams
BRYANT: 112 Universal, Hydraulic
RIVETT: #18M Tool Room Universal

GRINDERS—RADIUS
VAN NORMAN: #73, 839, 840 Oscillating
VAN NORMAN: #3½ Universal

GRINDERS—SURFACE
THOMPSON: 6"x12"x18" Type B
HEALD: Rotary 8" dia. chuck
HEALD: #22 Rotary—12" Chuck
GARDNER: 120A Opposed Head Disc

HONING & LAPPING
BARNES: 300 H Vertical Honing
MICROMATIC: M-310 Double End Horizontal
MICROMATIC: H-2 Single End Horizontal
NORTON: #28C and 28F Hyprolaps
NORTON: #2Fx40" Diameter Lapper
SCHRANER: External Cylindrical Lapper with six Heads Model A

GEAR & SPLINE GRINDERS
PRATT & WHITNEY: 18" single & double wheel
GEAR GRIND MACH: GG-18 (18"x24"). Hydraulic Spur Gears & Splines also Internal
GLEASON: #17 Spiral, Zerol & Hypoid Bevel
MAAG: S650 11¾" diameter

GEAR CUTTING MACHINES
BARBER-COLMAN: #3 Hobber
BROWN & SHARPE: #8 Cutter—72" diameter
CLEVELAND: #140 Hobber—1 spindle
FELLOWS: 6Z2 Shaper
FELLOWS: 6I, 9IA, 9AA, 7 & 72 Gear Shapers
FELLOWS: Straight Line Generator
GLEASON: 5" Straight Bevel Gear Generator
GLEASON: #12 Rough & Finish Generator
GOULD & EBERHARDT: 12H Hobber, 18" dia.
GOULD & EBERHARDT: 36BM Cutter
HAMILTON: 51 Hobber 6" diameter
SYKES: Gear Machinery (all sizes)

GEAR FINISHERS & TESTERS
FELLOWS: 6LSI & 15LSI Gear Lappers, External & Internal, Spur & Helical
FELLOWS: #12-C Gaging Tester
GLEASON: #13 Universal Gear Tester
GLEASON: #4 & #6 Bevel Gear Testers.
GLEASON: 5" Bevel Gear Tester
ILLINOIS: 814 Center distance & concentricity checker
ILLINOIS: 804 Bevel Gear Hand Rolling Fixture
ILLINOIS: #224 Involute Checker and Recorder
RED RING: RIC-12" Gear Tester
FELLOWS: 48M Rod Liner

PRECISION BORING
BARNES: #412 Horizontal 60" Travel
HEALD: 48A Single End 2-spindle
HEALD: 48B Double End Sorematic

LATHES—PRODUCTION
SUNDSTRAND: 8x16 Auto. Lathes
LODGE & SHIPLEY: #3A Duomatic
LIPE-ROLLWAY: 15"x30" Carbomatic
LEBLOND: 25"x48" Engine Lathe, raised to 40" N.E.P.: 30"x8'0" Engine Lathe, m.d.
HOUSTON-STANWOOD: 40"x16" b.c. Engine Lathe, m.d., Taper Att.

LATHES—TURRET
BULLARD: 24", 30" Vert. Spiral Drive
WEBSTER & BENNETT: Vertical Turret Lathes 30", 48" and 60" sizes
GISHOLT: 2L Saddle Type, Extended Bed
HERBERT: Turret Lathes (all sizes)

DRILLING MACHINES
AVEY: #2 Deep Hole Hydraulic
LELAND-GIFFORD: #2LMS Deep Hole Vertical
BARNES: 20½ 2 spindle on 4 spindle base
BAKER: 30HO 2 spindle Inverted 4" dia. cap.
BAKER: 217 Upright Heavy Duty 2" dia. cap.
FOSDICK: #48M Upright High Speed
PROVIDENCE ENG: 6-spindle ⅝" capacity
PRATT & WHITNEY: ⅛ to 50 Deep Hole Reamer
ARCHDALE: Radial, all sizes (New)
WALKER-TURNER: D-1100F 1" cap. floor type
WALKER-TURNER: D-950 ½" cap. bench type

MISCELLANEOUS
CINCINNATI: 2-36 Broaching Machine
N.B.P. PLANERS: 30"x30"x12" and 48"x48"x20'
BLOUNT: Polishing Lathe 12x48
GARDNER: #6 Disc Grinder—25" 10 HP
ALLEN: #2 Stud Setter
CAMPBELL: #42S Abrasive Cutalster
WILLIAMS: 10" Pipe Cut-Off
TANNEWITZ: GH-36 Band Saw High Speed
KENT: 3½" Bar Pointer and Chamfer
GENERAL: #33 Flexible Press
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No. 3 W & S Ram Type Univ. Turret Lathes.
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36" CINCINNATI H.D. Shaper, 1942
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#725A FELLOWS High Speed Shapers
No. 12 FELLOWS Gear Shaver.
Nos. 1LMS Leland-Gifford 6 Spindle Drills, 1942.

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7—No. 2G H.S. Serial Nos. 9165; 9279; 9281 (1942); 10898; 10960; 10987 (1944); 11129 (1945); Swing Stop, Vertical Cutoff Slide, 1¼" Spindle Cap., 3000 R.P.M. Spindle Speed, Motor in base. Beaver-Bilt.

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Each of the above machines is Beaver-Bilt and complete with the following standard equipment—Standard Capacity Feed Tube—Front and Back Circular Tool Posts—Work Pan—Wrench Rack—Turret Hand Lever—Full set of Feed Change Gears—Full set of Spindle Speed Change Gears—Stock Stands—Complete set of Oil Splash Guards.

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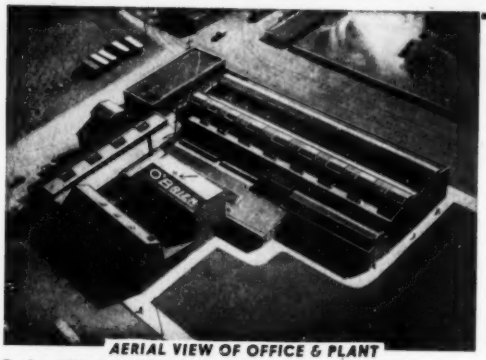

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Boring Mill, ‡ 45 Giddings and Lewis 4½" bar horiz.
Boring Mill, 3" Universal horiz.
Boring Mill, ‡32 Lucas 4" bar, table type.
Grinder, Surface, ‡34 Abrasive Vert., '41.
Grinder, ‡5 Bryant, internal, late.
Grinder, ‡34 Abrasive, vert., 1941.
Lathe, Gap, 19"/38" x 10' c.c. LeBlond, Timken.
Lathe, Automatic, 12" x 24" Lipe-Carbo.
Lathe, 16" x 6' South Bend, late (4).

‡3L Gisholt, 4½" hole, hardened ways, 18" chuck, motor drive.

Lathe, 20" x 48" cc. Springfield, mtr. in base.
Lathe, 16" x 10' Lodge & Shipley, M. in base.
Miller, Plain, ‡2B Brown & Sharpe, M. in base.
Miller, Prod., ‡1-18 Cincinnati.
Planer, 42" x 42" x 16' Gray, 3 hds., M. D.
Radial Drill, 6' Niles "Right Line," M. on arm.
Turret Lathe, ‡5 Midland Univ., preselect., '43.
Turret Lathe, ‡2 Bardon & Oliver, 1943.

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No. 2 Cincinnati Vertical Mill, late
No. 2-18 Cincinnati R & F and Plain Mills, late
No. 1-18 Cincinnati Mill, late
No. 72A5 and No. 72A3 Heald Plain Hy. Grinders, late
No. 2 Warner & Swasey Turret Lathe, serial 580374
No. 4 Warner & Swasey G.H. Univ. Turret Lathe, serial 338359
No. 5 Bardons & Oliver Turret Lathe, serial 14063
No. 12 Gisholt Hy. Aut. Turret Lathes, late (2)
No. 1A Warner & Swasey Turret Lathe, serial 345019
12"x63" Fay Automatic Lathe, 1940
R-14 Seneca Falls Lo-Swing Aut. Prod. Lathe, 1940
8½"x8" Goss & deLeeuw Chucker
9/16" Model DA2 Davenport Automatics (2)
S-2-F Nilson four slide Comb. Press & Wire Forming Machine, late
16"x54" Sidney G.H. Engine Lathe, late
16"-17½"x84" Porter McLeod Engine Lathes, late (2)
No. 262 Barnes G.H. Drill Press, late
No. 8 Marvel 18"x18" Metal Band Saw, late

MACHINE TOOLS

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No. 2 BROWN & SHARPE Universal Miller, late

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BOLT THREADER, 1½" Williams Reliance
BORING MILLS, 3½" & 4" bar Landis Floor Type (3)
BORING MILL, 60" Colburn Vert., 2 Hds., PRT
BORE-HONE, Barnes, 10" stroke, 9" bore, '42
BRASS LATHE, 21" Asme, Late, Hardened Ways
BROACH No. 21.6 Lapointe Hyd., Late
RADIAL, 5'12" col. American Trip. Purp., M-on-arm
RADIAL, 5'14" col. Amer. Trip. Purp. AC. M.D.
DRILL, 28" Colburn No. 6, 3" capty.
GEAR GENERATOR, 3" Gleason, Late
GEAR PLANER, 11" Rismoker, Bevel
GEAR SHAPER, No. 75 Fellows High Speed 61A, 64, 64A & 64SA Fellows
GRINDER, No. 16Y2B Bryant, Int., 1943
GRINDER, No. 174 Heald Gap, Int. 54" sw., '42
GRINDER, No. 72A5 Heald Internal, 1943
GRINDER, No. 75A Heald, Int. Hand Feed
GRINDER, No. 13 B. & S. Univ. M.D.
LATHES, 48"x20'0" cen. Simmons, like new, '42
36"x20' cen. Niles, 2 carr., 1 T.A., A.C.
32"x25' cen. Sommerfeld, 2 T.A., 2 carr., '42
24"x12' bed L. & S., Modern
22"-24½"x48" cen. Skoda, New
20"x54" cen. Reed Pran., T.A., '47
20"x48" cen. American, T.A., (2)
18"x60" cen. P. & W., T.A., Collets
14"-16½"x54" cen. Bradford, T.A., '43
No. 16 LeBlond Pro. 20" sw. x 36" cen.
TAPPERS, Nos. 1 & 2 Bakewell (4)
TURRET LA., 26" Libby "C" 4½" capty.
Nos. 3 & 4 Gisholts, Late
No. 1B Foster Univ., 2" capty. (2)
RIGID-MIL, 90" Sundstrand, Thin. 30"x120"
DUPLICATOR, BL-2416 Keller, 3 dim., 3 spin.
THREAD MILLER, 12"x60" Morey Shields, '42
MILLER, VERT., No. 4 Kempsmith, Maxi-Mil
MILLER, VERT., No. 4 Cincl. Hi Power, M.D.
MILLERS, VERT., Nos. 3 & 2M Cincl., Late
MILLER, HORIZ., No. 2 Stand. K. & T., M-in-base
PIPE THREADER, 2" Landis, AC, M.D.
PLANER, 48"x36"x8' Cincl. 4 Hd., Box, PRT. Force Feed
SHAPERS, 24" & 20" G. & E., AC, M.D.
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Flather 30" Automatic Gear Cutter
Gleason 3" Bevel Gear Generator
Gleason 6" Straight Bevel Gear Generator
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TOOL & CUTTER GRINDERS

Sellers #4T, fully Universal, NEW 1941
Sellers #6T, NEW 1941

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Landis 6" x 18", Type "C" Plain, Hydraulic, NEW 1942
Landis 26" x 144"
Landis Chaser Grinder, Model "Y"
Landis 16" x 72", Plain Cylindrical
Brown & Sharpe #12, Plain
Landis #2 Universal
Norton 10" x 24", Plain, Type BA

INTERNAL GRINDERS

Heald #70A, NEW 1941
Rivett #104-2, NEW 1942

LATHES

American 16" x 6' High Duty, Cullman Drive
American 16" x 8', 3 SCD, Bowl head type
American 18" x 6' Geared Head
American 18" x 8', Geared Head
American 18" x 8' Geared Head, 8 speed

AMERICAN 36" x 24' LATHE. INTERNAL FACE PLATE. GEARED HEAD. REBUILT. EQUAL TO NEW. IMMEDIATE DELIVERY

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LATHES (Cont'd)

American 20" x 8' Geared Head
American 24" x 8' Geared Head 8 speed
American 30" x 12' Geared Head, 12 speed
Boye & Emmes 18" x 8', Lima drive, double wall apron
Boye & Emmes 18" x 8', 3 SCD, double back geared
Boye & Emmes 20" x 8', 3 SCD, double back geared
Hendey 14" x 6', 4 SCD, Yoke head type
Hendey 14" x 6' Model E.B.M. Geared Leg
Hendey 18" x 8', 4 SCD
LeBlond 14" x 6', 4 SCD, single back geared
LeBlond 17" x 8', 3 SCD, Double back geared
LeBlond 21" x 8', 3 SCD, Double back geared
LeBlond 24" x 10', 3 SCD, Double back geared
LeBlond 25" x 12', Heavy Duty
Lodge & Shipley 14" x 5', 5 SCD, back geared
Lodge & Shipley 14" x 6', 3 SCD, Double back geared
Lodge & Shipley 18"x6', Geared Head
Lodge & Shipley 18" x 8', 5 SCD, Single back geared
Lodge & Shipley 18" x 8', 3 SCD, Double back geared
Lodge & Shipley 18" x 9', 3 SCD, Bowl head type

LATHES (Cont'd)

Lodge & Shipley 20"x8', Geared Head
Lodge & Shipley 20" x 10', 5 SCD
Lodge & Shipley 24" x 12', Selective Geared Head
Lodge & Shipley 27" x 18', Patent Head
Monarch 14" x 6', 3 SCD, Double back geared
Monarch 16"x6', Motor on leg
Monarch 16" x 8', 3 SCD, Double back geared
Niles Timesaver 30" x 10' centers, Double wall apron
Ames Model EH Bench Lathe, NEW 1942
Rivett Model 918 Bench Lathe, NEW 1941
Blount Model B-3 for Turning, Chucking, Polishing & Lapping, NEW 1941

MILLERS

Lees Bradner #40 Automatic Thread Miller, NEW 1942
Cincinnati #3 Plain Miller
Brown & Sharpe #5B Plain Miller
Brown & Sharpe #3A Universal Miller
Brown & Sharpe #4A Universal Miller
Brown & Sharpe #2 Vertical Miller
Cincinnati #4 Vert. High Power Miller

MISCELLANEOUS

Gray 36 x 36 x 12' Double Housing Planer
Marvel #8 Band Saw, Cap. 18" x 18"
Peerless 9" x 9" Hack Saw
Covel Hanchett #1130 Metal Saw Sharpener, 1943
Pratt & Whitney Bench Upright Shaving Machine, NEW 1941

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42" King Vertical Boring Mill
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#18-H Gould & Eberhardt Hobber
#725 Fellows Gear Shaper
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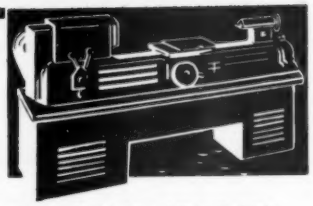
6"x18" Norton Type C Plain Cylindrical Grinder
6"x18" Model "ER" Cincinnati Plain Cylindrical Grinder
6"x30" Model "EA" Cincinnati Plain Cylindrical Grinder
10"x36" Model "EA" Cincinnati Plain Cylindrical Grinder

GRINDERS, INTERNAL
#16-16 Bryant Internal Hydraulic Hole Grinder
#16-28 Bryant Internal Hydraulic Hole Grinder



#72A3 Heald Plain Internal Hydraulic Grinder
#72A5 Heald Extended Bridge Internal Grinder

GRINDERS, SURFACE
Model "B" Pratt & Whitney Surface Grinder
#34 Abrasive Surface Grinder
#22 Heald Rotary Surface Grinder

GRINDERS, UNIVERSAL
#1 Norton Tool and Cutter Grinder
#3 Brown & Sharpe Universal Grinder

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14"x30" Sidney Engine Lathe
Bridgeford 28" Swing x 30' Bed Geared Head Lathe

MISCELLANEOUS
#2 Cincinnati Centerless Grinder
15-Ton Lucas Forcing Press
36" American "Heavy Pattern" Universal Shaper
#214 Besly Disc Grinder
#5 Cincinnati High Power Plain Mill

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GRINDER—Landis 10"x36" Hydraulic for 7"x7" Piston, with Dresser & 24"x9" Face Wheel.

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Pond 96"x80' BC 50 HP 3/60/220/440 Boring & Turning, 2 Carriages.

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10 Ton, P. & H. 23'8" span, DC.
¾ yd. Northwest Truck Crane 10 wheel Mott, Haven Chassis. Real Buy.

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Southwark 15"—3" Vertical Pyramid, DC.
Niles 11"x¾" Initial, AC.

SHEAR—Whiting Quickwork 50A Slitting & Circle cutting attachments 1942.

SLOTTER—Newton—20" x 42" diam. table.

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Model H-3 Barnes Hydram Drill
#35 Excello Thread Grinder
16-Y-28 Bryant Internal Grinder
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Giddings & Lewis No. 32, 3⅛" cap.
King 42" & 72" Vert. 2 rail heads
Lucas No. 31 Precision, 3" bar
Niles-Bement-Pond 4" Bar
Niles-Bement-Pont 4½" Bar
Niles-Bement-Pond 60" Vert.

DRILLS AND RADIALS
American 6'13", 5'11"
Buffalo #2 Motor Spindle
Canedy-Otto 3'-9" col.
Defiance #112, 21" Production type
Fosdick #3 BM, #3 taper
Natco B2 24 spindle
Sibley 24" & 28"

ENGRAVERS
Gorton #1A 2 Dimensional
Gorton #3B 3 Dimensional

GEAR EQUIPMENT
Barber-Colman #12 Hobber (2)
Brown & Sharpe #13 Cutter
Fellows High Speed Shapers #7, 712, 72, 725
Flather 72" Cutter
Gleason 3" Straight Bevel Generator
Gleason 11" Bevel
Gleason #4 Angular Bevel Tester
Gleason #2 Surface Hardener
Gould & Eberhardt 36" Cutter, Univ.
National Broach Red Ring Lapper
Schuchardt & Schutte #1 Hobber

GRINDERS, MISCELLANEOUS
Brown & Sharpe #1, #3 Univ. #13 Tool
Cincinnati #2 Centerless
Cinn 12 x 48" Univ., Gardner #226, 30" disc.
Covel #91A Univ. Tool & Cutter, Hammond #4

Heald 72A3 Int. Centerless Sizematic, #1 Tool
Landis 12"x36" Univ., Latest, #6 Thread
Landis 6" x 30" Type C Cyl.
Norton #2 Tool & Cutter 6"x18", 6x30" Type C cyl., 10x18"
Oliver #510 Drill Pointer, Sellers 4G, Black Diamond
Porter Cable Belt WGB, G8; Greeby Int.
Pratt & Whitney Radius #R6, K.O. Lee Tool

GRINDERS, SURFACE
Abrasive 3B 8x24", #33, #34 Vert.
Blanchard #16, 30" Mag. Chuck, B & S #2B Motor Spindle
G & L #25, 6" x 18"; #45, 12" x 24" Hyd. Feed
Heald 22—12" chuck, Arter 12"
Norton 6 x 18" Hyd., 10 x 36"
Pratt & Whitney 12 x 36" Vert.
Thompson Hyd. 6 x 10 x 18", 6 x 12 x 18"

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American 20" x 8' Bed G.H. Lathe
L & S #2A Duomatic. Like New
Fay Automatic 12" x 81"
Hardinge Precision 9", 1" Collet Cap., Rivett
Hendey 12 x 30" T.A., collets, etc.
Hendey 14" Yoke Head Lathes
LeBlond Regal 10" x 3' bed
Putnam 36" x 22'
Putnam 42" x 17'
Sebastian 12" x 4' G.H.
Wickes 32" x 35' Geared Head

MILLS, PLAIN, UNIVERSAL & PROD.
Brown & Sharpe #000, 21, #2A Univ.
Burke #4 Plain & Univ. Vert. Hd.
Cinn. 08 PL & Vert.—Rise & Fall
Cincinnati, 1M Univ.
Cincinnati #4, Univ. High Power
Kent Owens IV
Sundstrand 00 Rigidmil; Whitney Hand Mills
U. S. Multimills, MMI, Duplex

MILLS, VERTICAL
Cincinnati #4, 08 Vert.
Gorton, 8½D Duplicator
Morey #12M Profiler, 2 sp.
Pratt & Whitney #2 Jig Borer

PRESSES
Bliss 650 HI-Production Presses
Bliss 20, OBI, 58, 62, 162 OB.
Bliss 4½ Double Action. Roll Feeds
Bliss #78½, 330 Ton SS
Bliss 3½A Double Action Toggle
Ferracute EG54, 400 Ton Knuckle
Henry & Wright 100 Ton, 1943, Feeds
Niagara A13¾, O.B.I.
Toledo 400 Ton Knuckle Joint #663
Toledo 29 Double Action Cam
V. & O. #102 O.B.I. Reducing

HYDRAULIC EQUIPMENT
SELF CONTAINED PRESSES
500 Ton Lake Erie, 35" x 36" Platen 36" stroked opening
500 Ton Shaft Straightener 24' Long Bed. Watson Stillman
125 Ton Southwark Press, Bed 96" x 30". 30" stroke, 2 to 4 ft. opening
50 Ton Burroughs 8" stroke 18" x 17" Platen, 18" opening
80 Ton Wilson Press, 51"x24" Platen, 11½" Sp. 13" opening
50 Ton Hannifin, 20' St. 30 x 22 Bed—24" opening
35 Ton Oil Gear Straightener
50 Ton Stokes Molding Press
MISCELLANEOUS PRESSES
550 Ton Southwark, 42" x 32" Platen 28" St. 48" opening
300 Ton Watson Stillman 24 x 20" Platen 11" St. 21" opening
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TURRET LATHES
Acme 6W Fox
Brown & Sharpe, #1, 2 Hand
Gisholt, 2L, Foster #3B
Warner & Swasey #2A
Warner & Swasey #1A
Warner & Swasey #6

MISCELLANEOUS
Automatic 4 Sp. 1⅛" Cone
Band Saw: Tannewitz #36M, Marvel #8, DoAll Zephyr 36"
Filers—Do All Band Filer
Filers—Grob Band Filer
Hacksaw: Marvel 6A Automatic #6, #9, Peerless
Honer: Micromatic #H-1
Keyseater: Davis, Baker, M & M

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One No. 218 Excello heavy, double end
One No. 42 Heald heavy 2 spindle, work rotating type

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3" bar Universal, No. 3A
3¾" bar Lucas, No. 32
4" Niles Bement Pond floor type
4½" bar Lucas, No. 33
5" bar Jones planer table type

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24" Bullard vertical turret lathe
38"-44" Niles vertical turret lathe
52" King
84" Gisholt
100" Niles Bement Pond extra heavy

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No. 12 & type T Barber Colman
No. 8H, 12H, 16HS & 18H Gould & Eberhardt
No. 130 Cleveland Rigidhobber
Nos. 1 & 5A Lees Bradner
No. 7125A Fellows gear shaper

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6"x18", 10"x18", 10"x36" & 14"x36" Landis hydraulic
6"x18" No. 10 & 6"x32", No. 11 B & S mechanical
10"x24" & 16"x72" Landis mechanical
10"x36" Norton hydraulic semi-automatic
10"x18", 10"x30" & 10"x50" Norton mechanical
12"x36" Landis hydr. univ.

GRINDERS, SURFACE

Nos. 10, 16 & 16A2 Blanchard rotary
12" & 16", No. 22 Heald rotary
16" & 24", No. 25A Heald rotary
8" Pratt & Whitney rotary (tub)
8"x24", No. 34 Abrasive vertical
14"x36" Pratt & Whitney vertical
8"x24", No. 78 Wilmarth & Morman
8"x22", No. 3 Abrasive

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Nos. 1 & 4T Sellers
Gisholt for lathe & planer tools
No. R6 Keller radius tool
18" Whitney wet tool
No. 13 Brown & Sharpe univ.

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16"x5' Sebastian
16"x10' American
18"x8' Rockford
25"x48" centers Leblond
26"x120" centers Wickes
30"x16' Leblond
36"x108" centers Bridgeford
40"x80" centers Leblond

MILLERS, KNEE TYPE

Nos. 2AS Milwaukee plain
No. 3 Van Norman duplex
No. 3 Oesterlein
No. 3 Kempsmith Maximiller vertical
Nos. 1-12 & 1-18 Cincinnati production

SHAPERS & PLANERS

20" & 28" G. & E. shapers
20" Gemco univ. shapers
24" Columbia univ. shaper
16" Bement Miles slotter
30"x24"x6' Liberty openside planer
36"x36"x8' Gray planer
48"x48"x12' Cleveland openside planer

MISCELLANEOUS

BROACH—15 ton No. V3 Lapointe
HAMMER—No. 5N Nazel pneumatic
HONER—No. H1 Micromatic
LAPPER—No. 26 Norton Hyprolap
PRESS—1000 ton Bliss coining
RIVETER—Nos. 3A & 5A High Speed

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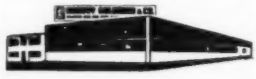

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2" New Britain No. 61, 6 Spindle

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4½" Bar Bemont Table Type, Horizontal
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6" Bar Betts Horizontal Floor Type
8" Bar Niles Horizontal
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36" Rogers Vertical
44" Cincinnati Vertical
44" Niles 20" Bar Travel, Fast Traverse
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100" Niles Vertical, 39" Bar Travel, Power Rapid Traverse

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20-Ton Amer. 36" Stroke Type VP Hyd. Broach
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Chandler 30"x30"x8'6" Planer, Table 12'x27"
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5"x24" Seneca Falls Model "U" Low Swing
9"x14" Porter Cable Lathe
12"x16" Porter Cable Carbo Lathe
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No. 2G Morey Turret Lathe 1"x14"—Bar Feed
No. A Libby Turret Lathe 3½"x18"
#7 Foster Turret, 3"x21" G.H.—Bar Feed
20"x48" Monarch Model CU Engine Lathe
20"x112" Lodge & Shipley Engine Lathe
21"x7' LeBlond G.H. Engine Lathe, with T.A.
24"x6' Boye & Emmes Engine Lathe
30"x60" Lodge & Shipley Engine Lathe

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Cincinnati #2 Plain Vertical Mill
Brown & Sharpe #3 Univ. Horiz. Mill
Kent-Owens #1-14, 6" Vertical Travel
Cincinnati #3-24 Hydromatic Mill
Cincinnati #4 Vertical High Power

MISCELLANEOUS

No. 3 Gleason Spiral Bevel Gear Generator
No. 18 Gleason Hypoid Gear Lappers
No. 6-60 Brown & Sharpe Gear Cutter
545 Ton Toledo #593⅓ S.S. Single Crank Press, Bed Area 42"x42" Shut Height 24", Stroke of slide 5"
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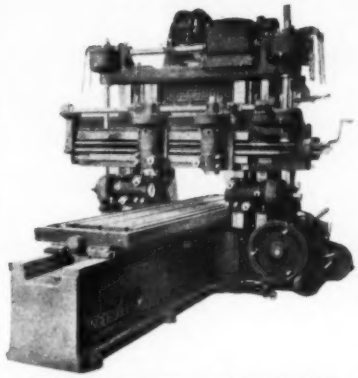

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CINCINNATI 1-30, duplex, vertical hydraulic, latest type
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DRILLS MISCELLANEOUS

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BARNES 20", 4 spindle, camel back, latest type
BARNES #420, deep hole, latest type
BARNES H3, hydram, capacity 3", inverted, latest type
BAUSH 1½" x 30" deep hole, latest type
FOOTE-BURT, 20 spindle, multiple, latest type
LeBLOND #2, deep hole, latest type
NATCO D-5, adjustable, multiple, latest type
NATCO 4AL, 30 spindle, multiple, latest type
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NATCO 2BL, adjustable, multiple, 24 spindle, latest

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HALL Style D Planetary, latest type
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INGERSOLL 30" x 42" x 12' adjustable rail, slab, M.D.
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SUNDSTRAND Model 3A, duplex, 42" feed, latest type
TAYLOR-FENN, M80, duplex spline, latest

SAWS

ESPEN LUCAS 670, 20" capacity, cold saw, hydraulic, latest
HELLER Model SS-1, 6¾" capacity, cold saw, M.D.
PEERLESS 14" x 14" hack, hydraulic, latest type

PLANERS

CLEVELAND 48" x 48" x 12', 3 heads, openside
BETTS (CONSOLIDATED) 108" x 84" x 50', 4 hds. P.R.T., Box Table, DC Reversing M.D.
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WOODWARD & POWELL 54" x 54" x 20', 4 hds., M.D.

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Milling Machines—No. 1 Universal, No. 1 American (new) plain, No. 1 Vertical.

Drills—Large selection, single and multiple spindles also bench types, many of them new.

Gear Cutters—Brown & Sharpe No. 3—26" Gould & Eberhardt 42".

Grinders—Cylindrical B & S No. 11, Planer type 16"x36" Surface 13"x63", also new (small) Universal bench and floor type. All with coolant, motorized.

Lathes—14"x8', 8', 10'—10"x6', 8', 10'—18"x8', 8' 10'—26"x10" all cone drive, several motorized also (new) 18"x8' and 10' geared head, motorized. Large stock 19" and 18" bench and floor type.

Planers—Single head 24"x8', 24"x8', 26"x8'.

Shapers—18", 20", 24" B.G. crank.

Turret Lathes—J & L, 2"x24"—3"x36" also Acme, W & S Turret (vertical) boring and facing mills, 5 hole turrets. 30", 40".

SPECIAL—New totally enclosed dust proof, fan cooled ball bearing saw arbor motors, plain shafts to size or threaded, and with collars, measures only 2¼" from center of shaft to flatted top (1 h.p. to 15 h.p.) 2 or 3 phase, 3600 r.p.m.

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20"x25" Fay Automatic. 1942.

DRILLS

4'11" Canedy Otto Radial.
No. 2 LMS Leland Gifford Hyd. 1942.

GEAR EQUIPMENT

No. 645A3 & 61A Fellows Gear Shaper. 1944.
No. 6 Gleason Revacycle. 1940.
No. 6 Gleason Gear Tester. 1942.
8" Red Ring Internal Shaver. 1942.
15" Red Ring Lapper. 1942.
Red Ring Universal Tester. 1942.

GRINDERS, CYLINDRICAL

14"x168" Norton Plain Type C. 1942.
14"x48" Norton Pl. Type C. Hyd. 1941.
14"x36" Landis Univ. Type C. Hd. 1942.
16"x36" Cincinnati Plain Hd. 1942.
6"x18" No. 10 Brown & Sharpe Pl. Hyd. 1943.

GRINDERS—INTERNAL

No. 24-36 Bryant Hyd. 1943.
No. 172 Heald Hyd. Gap. 1940.
No. 81 Heald Plain Hyd. 1940.
No. 73 Heald Airplane Cyl. 1942.
No. 30 Heald Hyd. 1943.

GRINDERS—THREAD

No. 33L Excello Precision. 1943.
No. 39A Excello Internal. 1942.
No. TG-615 Jones & Lamson. 1942.

GUN BARREL MACHINES

No. 410 Barnes Deep Hole Drill. 1943.
No. ½B x 50 P&W Reamer. 1942.
No. ½B x 30 P&W Reamer. 1942.
No. ½B x 30 P&W Rifler. 1942.

LATHES—ENGINE

36"x396" American G.H.
20"x240" LeBlond. 1941.

LATHES—PRODUCTION

No. 3 FU Foster "Fastermatic". 1942.
14"x42" Monarch "Magnamatic". 1941.
8"x108" Lo-Swing Semi. Auto. 1942.
No. 4D Potter & Johnson. 1942.

LATHES, TURRET

3⅛"x24" Acme Univ. 1943.
No. 5.0 Acme Univ. 1942.
No. 1H-5 Libby Univ. 1942.
No. 6R Denver Univ. 1942.
No. 5 Bardons & Oliver. 1940.

MILLS, PRODUCTION

No. 34-36 Cincinnati Hydro. 1942.
No. 4-48 Cin. Hydro. Tracer. 1943.
No. 1-16 Cincinnati. 1942.
No. 1-14 Kent Owens Hyd. 1942.
No. 0B Plain & R & F Cin. 1941.
No. 2 Sundstrand "Electromil". Late.

MILLS, THREAD

6"x30" LT Lees Bradner. 1942.

MILLS, UNIVERSAL

No. 3 Cincinnati D.T. 1945.

MISCELLANEOUS

48"x½" Niles Plate Straightener.
No. 616 Cleveland Rigidturner. 1942.

PRESSES

50 Ton Denison Straightening. 1942.

SHAPERS

24" Rockford H.D. Hyd. Latest.
6" Pratt & Whitney Vertical. 1942.

WELDERS

100 KVA Taylor-Winfield Seam. 1943.
60 KVA Selsky Spot. Like New.

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PRATT & WHITNEY Model "B" 16"x36" motor in base.

MONARCH 24"x162" ctrs. MD Engine Lathe—actual swing 26".

HENDEY 12"x30" Ctrs. 18-Speed Gr. Hd. Motor-in-Base (1942 vintage) Timken brg.—Collets, taper attachment, actual swing 14½"—1000 RPM.

LODGE & SHIPLEY 14"x30" Ctrs. Motor-in-base 12-Sp. selective gr. head—(1943 vintage) with taper attachment.

AMERICAN 16"x6' and 18"x8' 12-speed Gr. Hd. MD. swing 18½"x20½" ctrs. 31" and 50½".

TURRET LATHES

2—WARNER & SWASEY #1, ⅝"x4" Electric Turret Lathes (late type)—with 1/3 HP motor for power automatic chuck bar feed—4-speed motor

WARNER & SWASEY #2A MD Universal, Timken Bearing, covered ways, swing 20½", hole thru spindle 3⅛", bar cap. 3½" (arranged for chucking).

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BROWN & SHARPE 3A Univ. Constant Speed MD. atchmts—range 34"x12"x19".

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#28/60 Cincinnati Hydrotel, Sgl. Spindle, with hand controls (2)
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60" Bickford Vertical Boring Mill
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#2A, #3A, #4A Warner & Swasey Turret Lathes, latest type with taper attachment, all built 43 and later.

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Planers, 48x48x10' Cinn. Dbl. Housing

#1½ Yoder Roll Former, 8 Spdl, 1½" shaft dia. x 6½" Max. length flat strip, latest, w/cutoff.

Drill, Barnes deep hole, Horiz. 2 Spdl, latest
Broach, #5-42 and #25-48 duplex ram Surf, Broaches, late
Prod. Lathe Sundstrand #12, late
Prod. Lathe, #R-14 Lo-swing, late
Horiz. Mill #5 Cincinnati, latest

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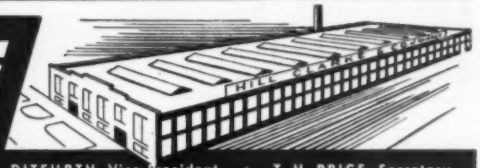

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AUTOMATICS
No. 49 New Britain, 4 Spdl. Chucker

DRILLS
1 Spdl—28" Sw—No. 2 LMS L.G. Hyd.
1 Spdl—24" Sw—No. 4 B. Edlund
2 Spdl—24" Sw—No. 2 Aveymatic
3 Spdl—15" Sw—No. 2—MA 6—Avey
4 Spdl—24" Sw—No. 3 Avey
6 Spdl—14" Sw—No. 2 LMS L.G. Hyd.
No. 112 Defiance

GEAR MACHINES
No. 61-A Fellows Gear Shaper (1942)
No. 7 Fellows Gear Shaper (1942)
No. 72 Fellows Gear Shaper
No. 72-A Fellows Gear Shaper (1942)
11" Gleason Bevel Gear Generator
12" Gleason Bevel Gear Generator
No. 13 Brown & Sharpe Spur & Bevel
No. 1 Whiton Auto. Gear Cutter
No. 6 Gleason Bevel Gear Tester (1942)

BORING MACHINES
No. 31 Lucas 3" bar, M.D.
3" Bar Universal Horizontal Boring
Rockford—3½" Bar
No. 2 Lambert 4" bar
24" Bullard New Era
42" Bullard New Era
42" King
60" Colburn, M.D.
72" Niles-Bement-Pond

GRINDERS
4"x12" Landis, Model H (1942)
4"x18" Landis, Model H (1942)
6"x18" Norton Type C Plain (1943)
6"x30" Norton Type C Plain (1943)
10"x48" Norton Type C Plain (1943)
10"x72" Landis Type C Hydraulic
Norton Motorized Grinders ranging from 6"x32" to 24"x144"
No. 104 Rivett Univ. Gdr. (1943)
No. 34 Abrasive Surface Grinder (1943)
No. 22—12" Heald Surf. Gdr.
No. 25-A Heald Surface Grinder
No. 72-A-3 Heald Internal (1942)
No. 72-A-5 Heald Internal (1942)
No. 72-A-5 Heald Extended Bridge Internal
No. 5 Bryant Internal Grinder
No. 16-16 Bryant Internal Grd.
No. 16-28 Bryant Internal Grd.
No. 24-26 Bryant Internal Gdr.
No. 81 Heald Centerless Internal

LATHES
18"x8' American Gdr. Head, M.D.
17"x8' LeBlond, Cone Hd., M.D.
18"x8' American Gd. Hd.
Model R-14 Seneca Falls Lo-Swing
No. 4R Libby (1942)
18" Libby, M.D.
No. 3-A Warner & Swasey, Bar

MILLING MACHINES
No. 3B Milwaukee Plain
No. 3 Cincinnati H.P. Universal
No. 4 Cincinnati H.P. Plain
No. 08 Cincinnati Vert.
No. 2½-B Milwaukee Vert.
No. 1-18 Cincinnati Mtg. (1942)
No. 2—18" Sundstrand Electromil (1942)
No. 2—24" Sundstrand Electromil (1942)
No. 4-48 Cincinnati Hyd. Tracer (1942)
No. 45-48 Cin. Hyd. Tracer (1941)
6"x36" Lees-Bradner—Model LT (1943)
12"x54" H.T. Lees-Bradner Thread Miller (1943)
10"x48" Hanson-Whitney Thread (1942)
10"x60" Pratt & Whitney Thrd. Mill
48"x24"x12' Ingersoll Slab Miller, 4 Hds.
36"x24"x12' Ingersoll Duplex Miller (1948)

MISCELLANEOUS
18" Dill Slotter
No. 8 Armstrong Band Saw
18" Newton Slotter
10"x10" Rassmussen Saw, Stock Fd.
4" Toledo Pipe Machine (1944)
No. 0 Bakewell Tapper
Baush Radial Tapper
Model H-7 Micromatic Vert. Hone, 1 Spdl.
Model H-702 Micromatic Vert. Hone, 1 Spdl.
Model 200 Micromatic Horiz. Hone, 1 Spdl.
Model H-2 Micromatic Horiz. Hone, 2 Spdl.

PLANERS
36"x36"x12' Cincinnati, 2 hds.
36"x36"x12' Gray, 2 Hds.
42"x42"x10' Cincinnati 2 hds.
48"x36"x14' Grey
48"x48"x12' Cincinnal, 4 Heads

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GEAR FINISHERS, rack type, ⌀854 Michigan

GRINDERS:
Thread, ⌀105 Sheffield
⌀6 Cincinnati Centerless
⌀1 Cincinnati Chucking
⌀12 Brown & Sharpe, 6 x 30 cylindrical, and ⌀5 B. & S.
⌀8, ⌀223, ⌀230 Gardner Disc
⌀226 Besley, ⌀220 Badger Opposed Disc
⌀25A—24" Heald & 12" Arter Rotary Surface
⌀44 & ⌀46 Excello Carbide Tool
⌀2 Norton Univ., Tool & Cutter
14" Pratt & Whitney Vertical Surface

LATHES:
Production, 4 x 60 & 6 x 12 Lo-Swing Turret, ⌀5 B & O, ⌀3A Warner & Swasey

MILLS:
LEVELLER, 72" Aetna-Standard
⌀1B Milwaukee Horiz., Plain
1-8 Kent-Owens Prod. Mill
TAPPERS, 2 to 4 spindle Webster-Perks

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LATHE—Engine, Mackintosh-Hemphill, 72"/110"x30' Centers (1943).
CRANE—150 Tonx30' span, Whiting, Bridge, plus 2 Aux. Hooks 25 ton (will widen to any span).
CRANE—Shepherd 3 Ton x 30' span, floor control.
CRANE—75 Ton x 58' span (extension to 70') (1942).

BORING MILLS—D & H 3½" horiz floor. Vertical Turret Lathe 30" Bullard 72", 2 swivel heads on rail (old).
HYDROHONER—Model H4 Micromatic.
DRILL PRESSES—Minster ⌀2D, 2½" cap. Hvy. Snyder, 1½", 28" swing.
GEAR SHAPERS (2)—Fellows ⌀6
FURNACE CONVEYOR—72"x24"x34' Electric & Gas at 900° F.
LEPEL—7½ KW Induction heat unit (late).
LATHES—Engine, Logan, q.c., 10"x4' cabinet. Engine, L & S 16"x30" C. Geared Head. Turret, Foster ⌀1B Universal, Chucker. Turret, Midland ⌀5 Univ., 2½" bar & chuck (1942).
OSTER—601 W.D. 1½" (1944)
TURRETS
Turrets, 1½", 1", 1 1/16" hand screws, cone type.
MILLERS—Newton Vert. 42" Rotary Hvy. Cinc. ⌀3 Vert. Hi Power Br. & Sh. ⌀3 Universal, ⌀2 Plain
PUNCH—Sq. end, Smith 1-1/16" thru ⅝".
ROLLS—Angle—Bertsch 3"x3"x⅜".
ROLLS—Bending—H. & J. 30'x¾", Pyr. Southwark 15'x3", Vert. Farnham 10'x⅜" radius.
SHEARS—Square—Famco Power 36"x18g (new). Square—Pexto 10'x10g. (1943). Alligator (⌀2) 24" blade, 3" Rds. Rotary—Quickwork ⌀50A, 48"x¾" (Late).
SQ.—Morgan 8'x1¼".
SHAPER—Cincinnati 24" b.g.
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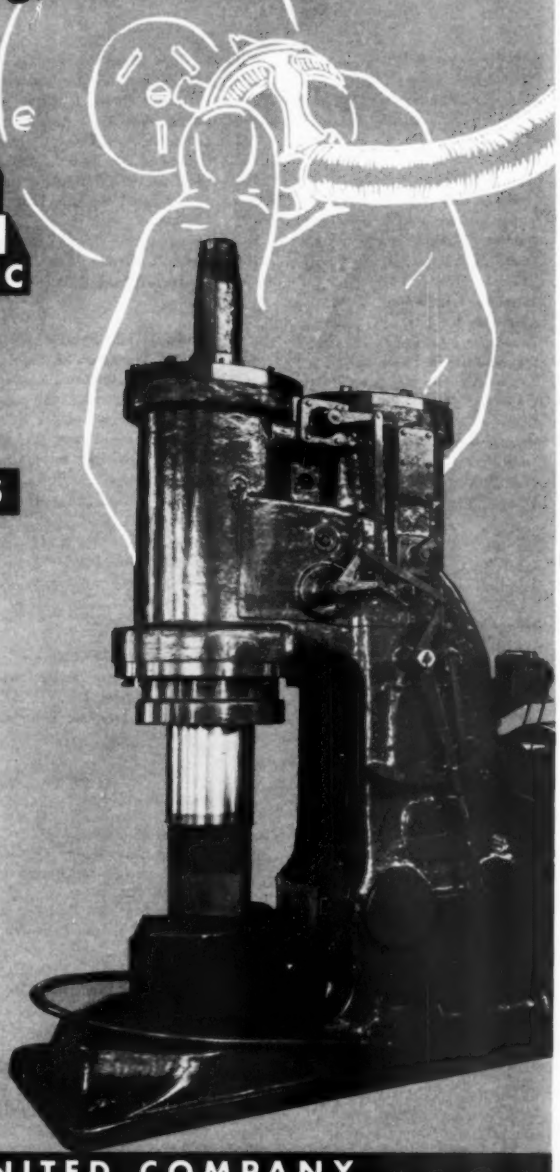

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40TH YEAR Atlas

10" LATHE

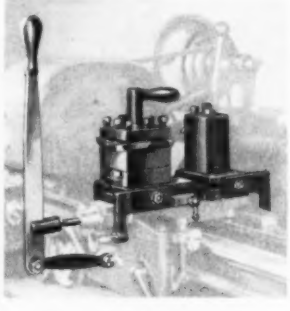
WITH TURRET ATTACHMENTS

FOR HIGH PRODUCTION OF SMALL PARTS

EXCLUSIVE ATLAS FEATURES

- ★ Timken tapered roller bearings.
- ★ 16 spindle speeds – 28 to 2072 RPM. Wide thread cutting range.
- ★ Heaviest back gears of any low-cost 10" lathe.
- ★ Power cross and longitudinal feeds standard equipment.

LEVER-TYPE CARRIAGE TURRET



This assembly replaces the standard screw feed for faster operations on forming, roughing, finishing, chamfering, and cutting off. The four-way tool post turret is released by convenient lock handle and rotating to any one of the four operating positions, automatically indexed. The back-slide tool post is used with lever for cut-offs.

Tool posts take ⅜" cutter bits. Adjustable stops at front and back of double tool cross slide are set to indicate cutting depths. A "multi-stop" is also available to accurately gauge length of each cut.

Atlas 10" lathes and accessories are precision built in every respect for close tolerance work.

Solves New Production Problems At Lowest Cost

Every feature needed to handle small parts production *quickly* and *economically* is provided by this Atlas 10" lathe with turret attachments. It gives you screw machine type of work at a cost of close to $500 (less motor) F.O.B.

Headstock spindle is Timken bearing equipped to stand up through round-the-clock production runs. Heaviest back gears of any 10" lathe permits heavier cuts. 16 spindle speeds (28 to 2072 RPM) give correct speed for every operation. Complete V-belt drive. Spindle hole takes stock to $1\frac{5}{16}$". Tailstock turret has semi-automatic indexing head with six ¾" holes for tool holders.

Delivery schedules are still within reason but getting tighter every day. It's wise to look ahead and check Atlas specifications with your requirements now. Send for latest catalog.

ATLAS PRESS COMPANY
204 N. PITCHER STREET
KALAMAZOO, MICHIGAN

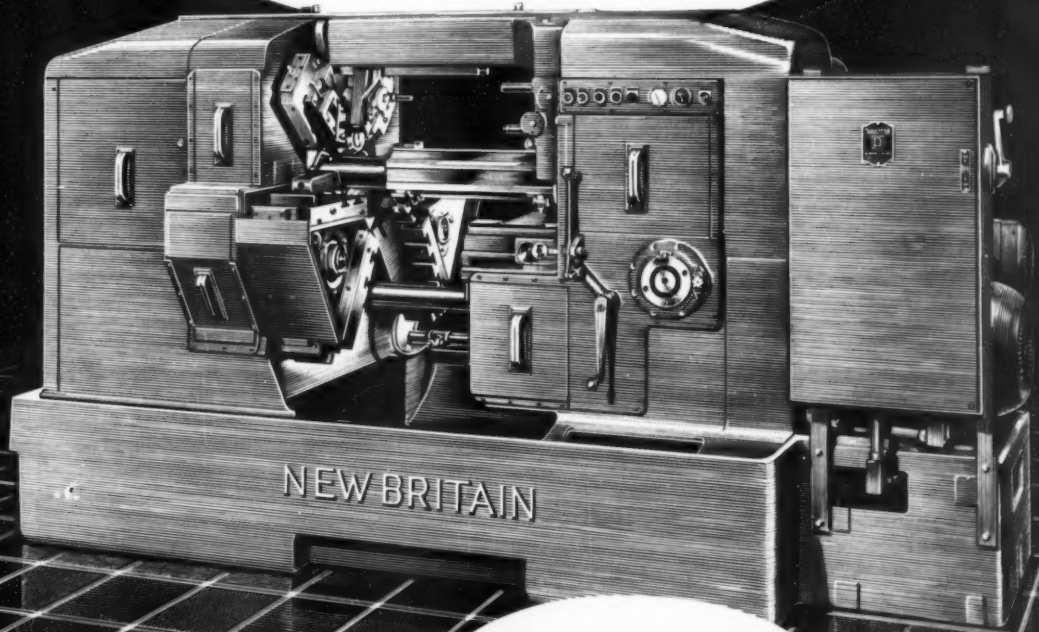
40TH YEAR Atlas
DEPENDABLE QUALITY TOOLS

Greater Productivity

...More Horsepower... Less Man Power

TODAY American Industry is under pressure to meet fantastic demands. Only yesterday, intense competition was the problem. Manufacturers have found the answer to both situations in more productive machine tools. The New Britain-Gridley Division, The New Britain Machine Company, New Britain, Conn., U.S.A.

AUTOMATIC BAR AND CHUCKING MACHINES • PRECISION BORING MACHINES
LUCAS HORIZONTAL BORING, DRILLING AND MILLING MACHINES



NEW BRITAIN
Automatics

How TIMKEN® bearings help cut gear shaving time in half

THIS new Red Ring Diagonal Gear Shaver finishes gears to amazing limits of accuracy in less than half the time it used to take. It is built by the National Broach and Machine Company, and is mounted on Timken® tapered roller bearings to insure maximum cutting precision and long, trouble-free service. Timken bearings are used in the tail stock and headstock on the intermediate and vertical drive shafts, and on the cutter spindle.

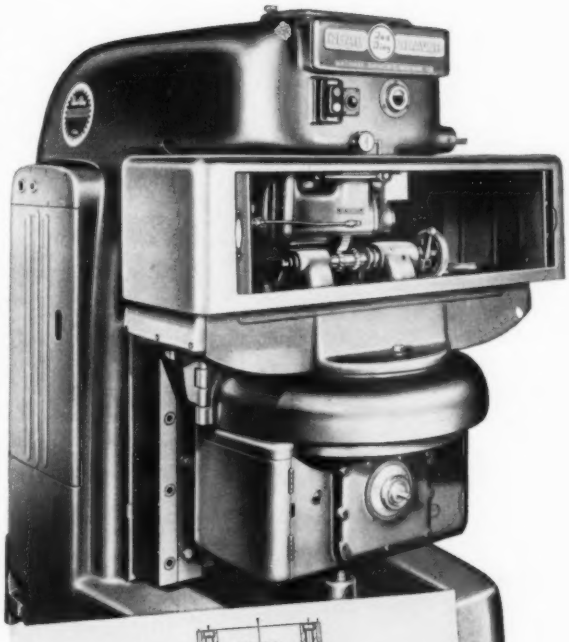
Fast, accurate gear finishing with minimum time out for maintenance is assured because Timken bearings keep shafts in rigid alignment, yet allowing them to rotate with negligible friction. Deflection and end-movement are minimized.

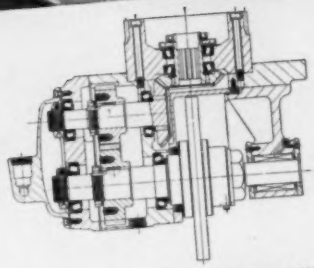
Line contact between the rollers and races gives Timken bearings extra load-carrying capacity. And because of their tapered construction they can take any combination of radial and thrust loads. Pre-loading is permitted to any practical degree.

Timken bearings are built for long, tough service. They're made of special analysis Timken fine alloy steel and are manufactured to extreme precision. Finished to incredible smoothness, Timken bearings virtually eliminate friction. And bearing surfaces are case-hardened for exceptional resistance to wear, and have tough, shock-resisting inner-cores.

Remember, no other bearing can give you *all* the advantages you get with Timken tapered roller bearings. Whether you build machine tools or buy them, always be sure they're Timken bearing equipped. Look for the trademark "Timken" on every bearing. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.





This is how the **NATIONAL BROACH AND MACHINE COMPANY** *uses Timken bearings in the cutter gear case of its Red Ring Gear Shaver. Greater accuracy, higher cutting speeds, trouble-free performance are assured.*

NEW ENGINEERING JOURNAL OFFERED!

529 PAGES! Includes new, technical information on bearing applications available nowhere else. Especially helpful to design engineers. Gives bearing dimensions, capacities, selection and mounting data. For a copy, write on your company letterhead to The Timken Roller Bearing Company, Canton 6, Ohio.

TIMKEN

TAPERED ROLLER BEARINGS

NOT JUST A BALL ○ NOT JUST A ROLLER ⬭ THE TIMKEN TAPERED ROLLER ⬭ BEARING TAKES RADIAL ⬭ AND THRUST ⬭ LOADS OR ANY COMBINATION